INOVACIONI MAKROMENADŽMENT U EKONOMIJI ZNANJA

Srđan Milićević[15], Vladimir Kostić[16] Maja Stošković[17]

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"Duša ekonomije znanja je neprekidna težnja za inovacijama".
Li Tein, Akademija društvenih nauka Kine

Apstrakt

U radu se nakon eksplikacije ključnih postulata paradigme ekonomije znanja sagledava značaj objedinjavanja nacionalih politika naučnog, tehnološkog i industrijskog razvoja u liku inovacionog makromenadžmenta. Učinjen je osvrt na instrumente ponude, tražnje i zaštite pomoću kojih preduzetnička država deluje na unapređenje nacionalne inovativnosti. Autori zastupaju mišljenje da noseći gradivni elemenat inovacionog makromenadžmenta predstavlja koncept nacionalnog inovacionog sistema (NIS), pri čemu platforma objedinjavanja aktivnosti akademske zajednice, privrede, države i društva predstavljaju tzv. spiralni modeli inovacija. Bazu ovih modela čini učenje, komuniciranje i saradnja, kao fundamentalni društveni procesi, s jedne, i rastuća umreženost aktivnosti svih učesnika u stvaranju novih znanja i posebno u komercijalnoj valorizacije znanja u inovacije, s druge strane.

Ključne reči: *ekonomija znanja, inovacioni makromenadžment, NIS, spiralni modeli kreiranja znanja i inovacija.*

JEL*: A13; E14; O30; D02;*

Uvod

Teorijsko utemeljenje koncepta makroekonomskog menadžmenta moguće je naći u stavu Pitera Drakera po kome menadžment označava praksu, veštinu, umetnost i nauku upravljanja procesima na različitim nivoima organizovnosti privrede i

[15] Docent dr Srđan Milićević, Univerzitet Metropolitan u Beogradu, Fakultet za menadžment, Tadeuša Košćuška 63, 11185 Beograd, Republika Srbija, Telefon: +381 64 11 62 902, E-mail: srdjan.milicevic@metropolitan.ac.rs

[16] Viši predavač dr Vladimir Kostić, Akademija tehničko vaspitačkih studija Odsek Vranje, Filipa Filipovića br. 20, 17000 Vranje, Republika Srbija, Telefon: +381 17/21-889, E-mail: vladimir.kostic@akademijanis.rs

[17] Dr Maja Stošković, Privredna komora Srbije, Resavska 13 - 15, 11000 Beograd, Republika Srbija, Telefon: +381 11 41 49 624, E-mail: maja.stoskovic@edu.rs

društva (Drucker, 1964). Kao sistem upravljanja proizvodnim entitetima, menadžment se javlja u devetnaestom, dok je svoju punu afirmaciju stekao u dvadesetom veku.

Razvoj menadžmenta tokom poslednjih tridesetak godina prati magistralne promene u privredi i društvu koje se najčešće obuhvaćene izrazom paradigma ekonomije znanja. Ključna karakteristika ekonomije znanja je naglašeno oslanjanje privrednih aktivnosti na kreativne sposobnosti ljudi uz istovremenu sve manju njihovu baziranost na korišćenje fizičkog kapitala i prirodnih resursa (Florida, 2002). U novonastalim uslovima privređivanja, kreatori nacionalnih strategija ekonomskog razvoja posvećuju sve veću pažnju kreiranju i difuziji novih znanja i što je moguće uspešnijoj komercijalnoj valorizaciji znanja u inovacije.

U načelu, moguće je praviti razliku između menadžmenta na mikro i menadžmenta na makro nivou. Sadržajna obuhvatnost kategorije mikromenadžmenta se rasprostire na brojne i sve složenije dimenzije upravljanja funkcionisanjem ekonomskih subjekata, dok se sadržaj makromenadžmenta u određenom smislu može poistovetiti sa mnogobrojnim aktivnostima planiranja i upravljanja privrednim tokovima u nacionalnoj ekonomiji. „Pod makroekonomskim menadžmentom treba razumeti skup mera i aktivnosti koje preduzimaju kreatori politike ekonomskog i šire, politike društvenog razvoja, sami ili u sadejstvu sa nekim od mnogobrojnih ekonomskih entiteta u koncipiranju i reailizaciji definisanih ciljeva društveno-ekonomskog razvoja“ (Cvetanović & Novaković, 2018: 131). Pritom, ne sme se ni jednog momenta gubiti iz vida činjenica da se ekonomski život odvija u mikroekonomskim entitetima i da je fundamentalna premisa efikasnosti politike upravljanja razvojem nacionalnih privreda uspešnost funkcionisanja njenih preduzeća.

Značaj znanja za ekonomske procese se korenito uvećao tokom poslednjih godina. Njegova komercijalna valorizacija u inovacije promovisana je u esencijalni pokretač rasta produktivnosti rada i unapređenja konkurentnosti na svim nivoima (Atkison & Ezzel, 2014; Nijkamp & Siedschlag, 2011). To je za rezultat imalo afirmaciju intelektualnog kapitala u svojstvu pokretača produktivnosti rada i unapređenja konkurentnosti. Na makroekonomskoj ravni je došlo do afirmacije novih teorijskih koncepata poput nove teorije ekonomskog rasta (Romer, 1986; Lucas, 1988), evoluciono-inovacionog pristupa u istraživanju ekonomskih pojava (Nelson & Winter, 1982), nove koncepcije nacionalnog bogatstva (Shults, 1981), novog javnog menadžmenta (Osborne & Gaebler, 2000). Teorijski postament ovih pristupa je decidan stav njihovih tvoraca da proizvodnja i komercijalna valorizacija znanja predstavlja magistralnu pokretačku snagu razvoja tržišnih privreda (Wickham, 2001).

Zajednička nit svih ovih teorijskih pristupa je osporavanje ključnih polazišta neoklasične ekonomske teorije po pitanju postojanja tržišne ravnoteže,

neminovnosti ispoljvanja zakona opadajućih prinosa faktora proizvodnje, egzogene prirode inovacija (Fagerberg, 2001). Na određen način i sam koncept inovacionog menadžmenta implicite podrazumeva negaciju navedenih teorijskih polazišta neoklasičnih teoretičara. Konkretno, noviji pristupi ističu daleko širu opravdanost državnih intervencija u privredi a ne samo u slučaju neutralisanja tržišnih nedostataka kako su smatrali neoklasični ekonomisti, mogućnosti ispoljavanja neopadajućih prinosa faktora proizvodnje zahvaljujući korišćenju znanja kao praktično neograničenom proizvodnom resursu, endogenoj prirodi inovacija koja implicite i eksplicite opravdava aktivnu ulogu države u planiranju, upravljanju i kontroli inovacionih aktivnosti ekonomskih aktera (Macukato, 2014; Mazzucato & Semieniuk, 2017). Novije teorije ekonomskog razvoja pretpostavljaju da inovacije pretstavljaju unutrašnji ishod javnih i privatnih investicija u ljudski kapital, ulaganja u istraživačko-razvojne oblasti proizvodnje, kao i dizajna najšiereg društvenog ambijenta u kome ekonomski subjekti funkcionišu (Nelson & Winter, 1982).

Među najvažnijim pokretačima ekonomskog razvoja u savremenim uslovima u literaturi se ističu sistem obrazovanja i sticanja znanja, osnovna i primenjena istraživanja, kompetentnost NIS-a (Friman, 1987; Lundvall, 1992; Nelson, 1993). Ipak, po gotovo nepodeljenom mišljenju analitičara, odlučujuća uloga u oblikovanju uslova koji pogoduju dugoročno održivom rastu i razvoju pojedinih zemalja i njihovih regiona pripada uspešnosti kreiranja i komercijalizacije znanja u inovacije (Švarc, 2009; Leković, 2018). Važnu platformu u procesima kreiranja i komercijalne valoruzacije znanja u inovacije predstavlja NIS-a baziran na spiralnim (engl. *helix*) modelima povezivanja akademske zajednice, proizvodnje, države i društvene zajednice (Ješić, 2015).

Cilj rada i korišćena metodologija

Imajući u vidu prethodno prezentovane konstatacije, ciljevi rada su sledeći: a) objašnjenje ključnih karakteristika ekonomije znanja, b) apostrofiranje integrativnog karaktera inovacionog makromenadžmenta u smislu objedinjavanja sadržaja politika naučnog, tehnološkog i industrijskog razvoja na nivou pojedinih nacionalnih ekonomija, c) ukazivanje na značaj koncepta NIS-a u inovacioom makromenadžmentu i d) analiza mesta spiralniih modela kreiranja znanja i njegove komercijalizacije u inovacije u ekonomiji znanja.

Postavljene su sledeće istraživačke hipoteze:

H1: Inovacioni makromenadžment u uslovima privređivanja koji omeđuju izazovi i dometi ekonomije znanja predstavlja nezaobilazan instrument u realizaciji savremenih strategija ekonomskog razvoja.

H2: Noseći gradivni element inovacionog makromenadžmenta u ekonomiji znanja predstavlja koncept NIS-a.

H3: Platformu međusobne koordinacije aktivnosti aktera NIS-a predstavljaju spiralni modeli kreiranja znanja i njegove komercijalne valorizacije u inovacije.

U radu je pomoću metoda analize i kompilacije prezentovana objedinjavaća dimenzija inovacionog makromenadžmena u smislu povezivanja politika naučnog, tehnološkog i industrijskog razvoja zemalja u ekonomiji znanja. Pomoću deskriptivnog metoda bliže je objašnjena ideja koncepta NIS-a koji je od esencijalne važnosti za razumevanje ne samo suštine inovacionog makromenadžmenta, već i neodrživosti stavova neoklasičnih ekonomskih teoretičara po pitanju egzogene prirode kategorije tehnoloških promena. U cilju izbegavanja detaljnijih deskriptivnih opisa suštine i pojedinih elemenata konstrukcionog dizajna spiralnih modela kreiranja i komercijalizacije znanja u inovacije korišćena je grafička eksplikacija povezanosti njihovih ključnih aktera.

Rezultati rada sa diskusijom

Paradigma ekonomije znanja

Znanje predstavlja „skup činjenica, informacija i veština stečenih obrazovanjem ili iskustvom, sa ciljem teorijskog ili praktičnog razumevanja i rešavanja problema. Ono postaje vredna imovina neophodna u svim sferama odlučivanja. Doprinosi razvoju pojedinca, organizacije i društva" (Drašković, 2010: 84). Paradigma "ekonomije znanja" u ovom veku inspirativna je istraživačka tema u mnogim društvenim naukama. „Ekonomija znanja se formira i širi na bazi korišćenja znanja kao unikalnog, neograničenog i samostalnog faktora proizvodnje, kojeg je nemoguće supstituisati drugim resursima. U njoj se znanje pretvara u ekonomska dobra i dohodak u većini privrednih djelatnosti, a ne samo u onima koje su direktno povezane s najvišim tehnologijama. Organizacije se sve više pretvaraju u inovacione, pri čemu kao predmet inovacije postaju ne samo proizvodi i tehnologije, nego i načini organizacije i uzajamnog djelovanja s kupcima" (Drašković, 2010: 84). Iako sam koncept još uvek ne predstavlja u potpunosti sadržajno zaokruženu celinu, veliki broj ekonomskih analitičara smatra da je razumevanje njegove suštine i dometa polazište sagledavanja nosećih društvenih i ekonomskih promena u svetu tokom poslednjih dvadesetak godina. (Beraha & Đuričin, 2022).

Počev od 1990. godina, razvoj novih, a pre svega informacionih i telekomunikacionih tehnologija je delovao u pravcu suštinske transformacije strukture svetske privrede. Sredine koje su zakoračile dublje u razvoj privrede temeljene na znanju su iskazale neuporedivo boje makroekonomske performanse u odnosu na zemlje koje su kasnile u složenim procesima diigitalizacije privrede i društva (Huggins & Izushi, 2007).

Afirmacija paradigme ekonomije znanja dovela je do izmenjenog pristupa u ekonomskim istraživanjima do tog vremena dominantno temeljenih na analitičkom instrumentarijumu industrijske ekonomije. Obuhvatnost i karkter ovih

promena prezentovana je u tabeli 1.

Tabela 1: Osnovne premise ekonomske teorije industrijskog društva i ekonomije znanja

Industrijsko društvo	**Ekonomija znanja**
Teorijski postulati	
▪ egzogena priroda inovacija ▪ opadajući prinosi ▪ tržišna ravnoteža	▪ endogena priroda inovacija ▪ neopadajući (konstantni ili rastući) prinosi ▪ tržišne neefikasnosti (pozitivne i negativne eksternalije, prelivanja tehnologije i znanja)
Faktori proizvodnje	
▪ fizički kapital (oprema i građevinski objekti) ▪ ljudski rad ▪ zemljište	▪ obrazovanje ▪ istraživanje i razvoj ▪ tehnologija
Osnova konkurencije na tržištu	
▪ troškovi ▪ cene	▪ znanje ▪ inovacije
Svrsishodnost državnih intervencija	
▪ državne intervencije su u osnovi npotrebne	▪ svrsishodnost makroekonomskog menadžmenta

Izvor: Autori

Ekonomija znanja označila je kombinovanje ekonomskih teorija baziranih na zakonima trzišta i korisnosti dobara sa neopipljivim vrednostima. „U ekonomiji baziranoj na znanju, mnoge kompanije kreiraju, stiču i održavaju konkurentsku prednost na turbulentnom tržištu zahvaljujući inovacijama“ (Miletić, Trajković & Mrdak, 2021: 165). Konkurentska prednost se seli od fizičkih prema neopipljivim i od vidljivih prema nevidljivim činiocima. Znanje valorizovano u inovacije igra odlučujuću ulogu u stvaranju ekonomskih vrednosti. Za razliku od industrijske ekonomije u kojoj je bila upitna državna intervencija na tržištu, u ekonomiji znanja postoji evidenta potreba za makroekonomskim upravljanjem ključnim privrednim promenama.

Integrativni karakter inovacionog makromendžmenta

Sagledavajući aktivnosti i potencijalne domete savremene države u oblastima kreiranja znanja u literaturi je prisutno njihovo identifikovanje nacionlnom politikom inovacija, odnosno inovacionim makromenadžmentom. Kombinacija široke palete intervencija savremene države u domenima razvoja nauke, tehnologije i instrijske proizvodnje stvara plodnu inovacionu klimu, koja u

konačnom skoru može biti od značaja u procesu povećanja inovacionog potencijala preduzeća i zemalja.

Inovacioni makromenadžment sve je značajnije sredstvo proaktivnog delovanja države u pravcu povezivanja znanja i preduzetništva, odnosno povezivanja naučnoistraživačkog sektora sa delovima privrede bitnim za proces kapitalizacije znanja. Njime savremena država nastoji da integriše upravljanje naučnim istraživanjima, tehnološkim i industrijskim razvojem u jedinstvenu politiku kreiranja znanja i njegove valorizacije u inovacije.

Teorijski fundus ovako shvaćenog inovacionog makromenadžmenta je evolitivna ekonomska misao. Suprotno porukama neoliberalne ekonomske teorije, evolutivna misao konstatuje da je podržavajuća uloga države u oblasti naučnog, tehnološkog i industrijskog razvoja preko potrebna aktivnost koja se ni izdaleka ne svodi na ublažavanje tržišnih neefikasnosti na čemu su insistirali ekonomisti neoklasične provenijencije. Naprotiv, delovanje države na unapređenje inovativnosti ekonomskih subjekata, pored kreiranja institucionalnog ambijenta koji pogoduje stvaranju znanja i posebno pogoduje njegovoj komercijalizaciji u inovacije podrazumeva integraciju znanja, inovacija i preduzetništva kao ključnih pokretača rasta i razvoja preduzeća i zemalja u ekonomiji znanja. Na dizajn tog ambijenta, pored naučne i tehnološke infrastrukture bitan uticaj imaju „obrazovna politika, politika tržišne konkurencije, informaciono-komunikaciona infrastruktura“ (Švarc, 2009: 23). U ovom kontekstu, inovacioni makromenadžment se može označiti amalgamom politike upravljanja naučnom, tehnološkom i industrijskom politikom pojedinih zemalja.

Veliki je broj instrumenata čijim korišćenjem država nastoji da unapredi inovativnost u nacionalnim razmerama. U načelu, moguće je praviti razliku između instrumenata ponude, tražnje i instrumenata regulacije (Cvetanović, 2002).

Instrumenti ponude se temelje na finansijskoj, materijalnoj i infrastrukturnoj podršci države unapređenju inovacione osposobljenosti pojedinih privrednih subjekata. Primera radi, javni sektor je bio ključan za nesmetano funkcionisanje osnovnih, a ne retko i za mnoga primenjena istraživanja i za obezbeđivanje finansijskih sredstava za pokretanje mnogih visoko rizičnih projekata, posebno u ranoj fazi njihove realizacije. Ulaganja u istraživačke i razvojne aktivnosti podstiču rast inovativnosti i konkretnu primenu inovativnih rešenja (Đuričin & Beraha, 2021).

Instrumenti tražnje se ogledaju u ogromnim javnim kupovinama proizvoda novih tehnologija ne retko u inicijalnim fazama njihovog nastanka. Drugačije kazano, javni sektor je direktno delovao na stvaranje tržišta mnogih inovacionih proizvoda velikim i sigurnim kupovinama proizvoda novih tehnologija (Perez, 2013).

Treća grupa instrumenata inovacionog makromenadžmenta su instrumenti zaštite i

regulacije. Obuhvataju brojna zakonska i regulativna rešenja putem kojih se na indirektan način deluje na stvaranje ambijenta povoljnog za nastanak i najširu difuziju inovacija.

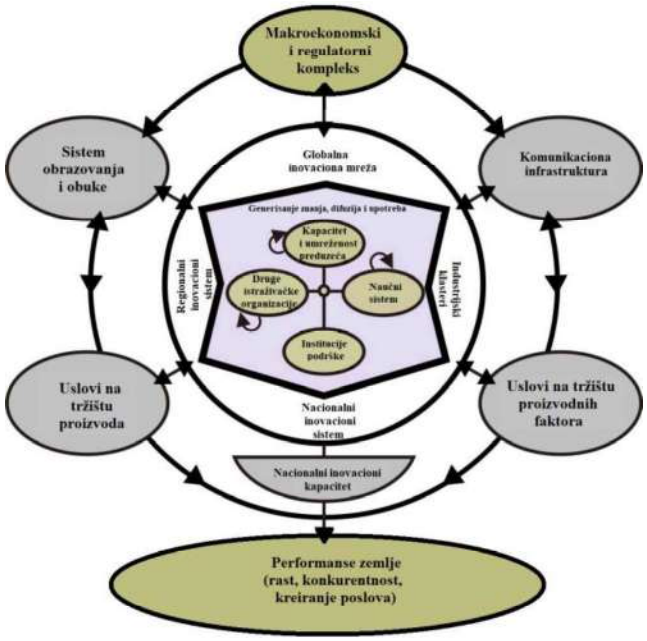
Značaj koncepta NIS-a za savremeni makromenadžment inovacija

U epicentru inovacionog makromenadžmenta nalazi se koncept NIS-a. Nastanak ovog koncepta se vezuje za britanskog ekonomistu Frimana (Freeman, 1987; 1995), švedskog ekonomistu Lundvala (Lundvall, 1992) i američkog neoevolutivnog ekonomistu Nelsona (Nelson, 1993). Ovi istraživači su imali drugačije viđenje nastanka i difuzije inovacija u poređenju sa pristupom neoklasičara (Soete, 2010). Koncept NIS-a apostrofira važnost interakcije između aktera u inovacionom procesu i ukazuje na različite forme inovacionih procesa oblikovanih brojnim društvenim, institucionalnim i političkim činiocima (Fagerberg & Vespagen, 2009). Dometi kvalitetnog NIS-a kao okvira preko koga inovacioni makromenadžment ispoljava svoje delovanje na rastuću komercijalnu valorizaciju znanja u inovacije u suštini su determinisani faktorima endogene prirode. Koncept NIS-a neposredno je povezan sa šumpeterijanskim pristupom sagledavanja preduzetništva kao izražajnog oblika inovativnog ekonomskog ponašanja. Isti apostrofira prisutnost elemenata rizika i neizvesnosti u procesima kreiranja znanja i njegove komercijalizacije inovacije.

Klasični pristupi istraživanju inovacija najviše su se oslanjali na analizu aktivnosti istraživanja i razvoja. Međutim, neoevolutivni ekonomisti sa pravom primećuju da nisu isključivo rezultati istraživanja i razvoja važni za nastanak i difuziju inovacija. Značajna podrška nastanku inovacijama predstavljaju odnosi između proizvođača i potrošača, raspoloživost odgovarajućom opremom, obučenost zaposlenih (Lundval, 1992). Ukratko, inovacije nastaju kako u procesu proizvodnje, tako i u distribuciji i potrošnji (Godin, 2006a; 2006b).

Smatra se da se inovacioni procesi dominantno odvijaju putem interakcije. Interaktivnost apostrofira značaj učenja i prilagođavanja ekonomskih aktera događajućim promenama u okruženju. Uspešni inovacioni sistemi dizajniraju ambijent koji pogoduje procesu stvaranja novih znanja i posebno njegovoj komercijalinoj valorizaciji u inovacije. Takve sisteme odlikuje izražena mobilnost resursa i različitih oblika kapitala (Slika 1).

Slika 1: Veze između ključnih aktera NIS-a



Izvor: Schrempf, Kaplan & Schroeder, 2013: 9.

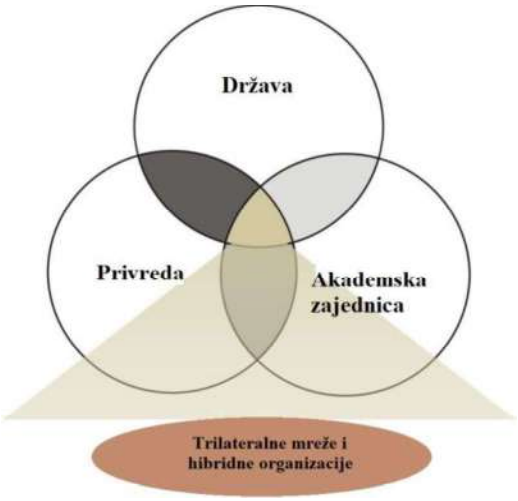
Efikasnost i efektivnost NIS-a umnogome je funkcija uspešnosti razmene i cirkulacije znanja između pojedinaca, preduzeća i sektora, odnosno proizvodnje i difuzije znanja koje omogućuju njegovu proizvodnu eksploataciju i tržišnu valorizaciju. Premda su dominantni oblici proizvodnje, transfera i iskorišćavanja znanja specifični za svaki nacionalni inovacioni sistem, moguće je u savremenim proizvodnim i društvenim uslovima prepoznati činjenicu da na značaju uspešnosti preduzeća dobijajaju ulaganja u aktivnosti istraživanja i razvoja, obrazovanja i sticanja najrazličitijh radnih veština.

Spiralni modeli kreiranja znanja i njegove komercijalizaacije u inovacije

Spiralni modeli ukazuju na rastući značaj umrežavanja i međusektorske saradnje svih aktera inovacionog sistema uključenih u proces stvaranja i valorizacije znanja u inovacije (Etzkowitz & Leydesdorff, 2000). Jedan broj autora, čini se sa punim pravom, je mišljenja da spiralni modeli inovacija predstavljaju osnovu savremenih NIS-a (Ješić, 2015). Drugi, pak, ove modele stavljaju u istu ravan sa konceptom NIS-a, napominjući da za razliku od njega u kome dominantnu ulogu i značaj ima privreda, tj. preduzeća, spiralni modeli akcenatiraju tesnu povezanost i umreženost sfera akademske zajednice, privrede i države sa podjednakom važnošću u nacionalnoj inovacionoj mreži (Pokrajac, 2016). “U ekonomiji znanja, stvaranje baze znanja zavisi od sinergija ostvarenih između tri glavna aktera u ekonomiji: akademske zajednice, sveta biznisa i vlade. Svaki akter može biti povezan s određenim elementom ekonomije: univerziteti su odgovorni za

stvaranje noviteta, poslovne firme stvaraju ekonomsko bogatstvo, a vlada je odgovorna za upravljanje interakcijama među akterima, ali je i odgovorna za poštovanje društvenih pravila, tj. zakonitost u radu“ (Pokrajac, 2016: 120). Drugim rečima, “model trostruke spirale stimuliše aktere na kooperativnost u radu u otvorenom prostoru cirkulacije invencija, znanja i inovacija. Zbog ogromnog sinergijskog potencijala koji se ostvaruje saradnjom svih aktera, ovaj model se ne retko u stručnoj literaturi sreće pod nazivom uspavani div. Da bi se taj spavajući div probudio svaki akter mora biti osposobljen za efikasne interakcije, što upućuje da slabost nekog od učesnika vodi raspadu i čitavog modela trostruke spirale” (Pokrajac, 2016: 120).

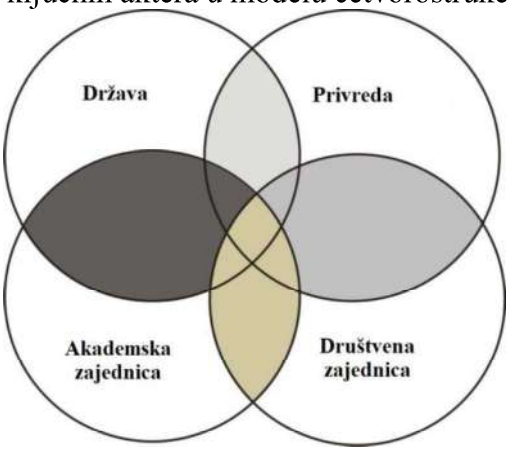
Slika 2. Trilateralna povezanost u modelu trostruke spirale



Adaptirano prema: Etzkowitz & Leydesdorff, 2000: 111.

Model četvorostruke spirale (*engl. Quadruple helix model*) polazi od pretpostavke po kojoj *akademska zajedica, privreda, država i društvo* funkcionišu na principima otvorene cirkulacije znanja, procesa učenja, komunikacija i međusobne saradnje (slika 3). Ovakve spiralne povezanosti za rezultat imaju višestruke efekte u procesima kreiranja znanja i njegove kapitalizacije u inovacije (Carayannis & Campbell, 2006).

Slika 3. Veze između ključnih aktera u modelu četvorostruke spirale

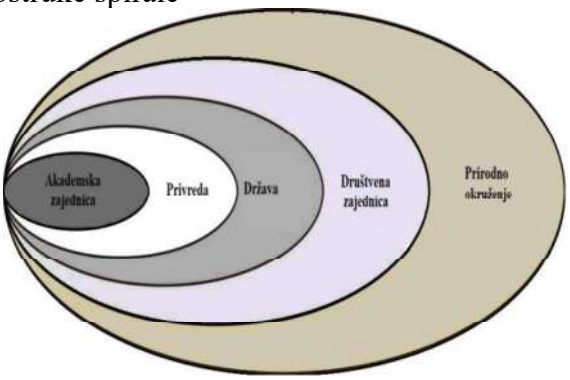


Izvor: Leydesdorff & Meyer, 2006.

U sagledavanju strukture i logike funkcionisanja modela četvorostruke spirale istraživači akcentiraju mrežu preklapanja aktivnosti svih aktera u modelu. Komplementarne relacije činilaca četvorostruke spirale omogućuju stvaranje fleksibilnog sistema NIS-a, čime se daje značajan doprinos postizanju održivog razvoja ekonomiji, odnosno društvu znanja.

Model petostruke spirale *(engl. Quintiple helix model)* nastoji da relativizira mnoge kontradiktornosti paradigme održivosti. U fokusu modela nalazi se način na koji društveno-ekološka promena može unaprediti proizvodnju znanja i njegovu valorizacija u inovacije (Carayannis, Barth & Campbell, 2012). Ovaj model dopunjuje model četvorostrukuke spirale petim podsistemom – prirodnim okruženjem (Slika 5).

Slika 4. Model petostruke spirale

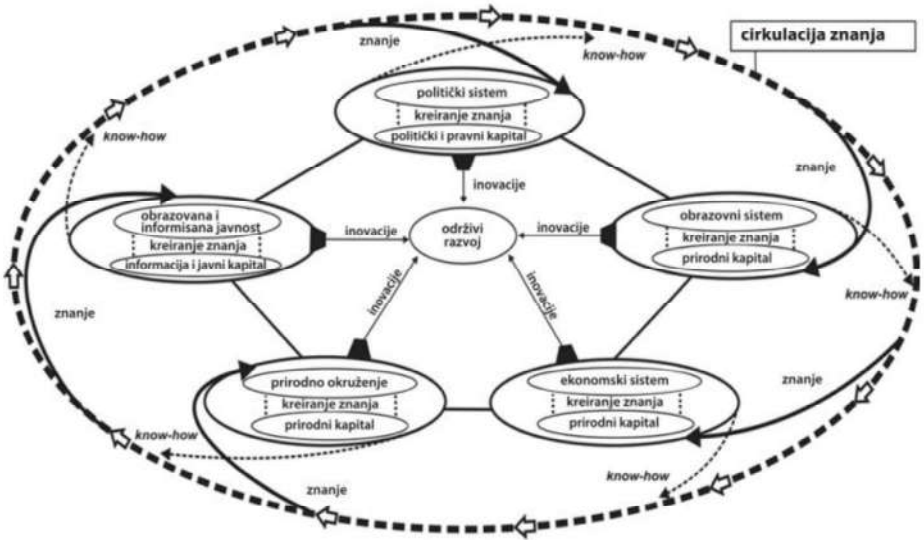


Izvor: Carayannis, Barth & Campbell, 2012: 6.

Na slici 5 prezentovane su funkcije modela petostruke spirale. Primećuje se da on na svojevrstan način ukazujuje na činjenicu da znanje poseduje kvalitete i funkcije inputa i autputa za svaki podsistem posmatran pojedinačno. Ulazeći kao input u

jedan podsistem, znanje izlazi kao autput u drugi podsistem, koji dalje predstavlja input za sledeći podsistem, kroz neprekidnu cirkulaciju i stvaranje inovacija. Na ovakav način, cirkulacija znanja kontinuirano deluje u pravcu stimulisanja procesa kreiranja novog znanja i njegove komercijalizacije u inovacije (Carayannis, Barth & Campbell, 2012).

Slika 5: Funkcije modela petostruke spirale



Izvor: Carayannis, Barth & Campbell, 2012: 7.

Model pokazuje da ulaganje u znanje i promociju kreiranja znanja stvara ključne impulse za inovaciju. Iniciranjem malih, ali kontinuiranih koraka, kroz sinergijski potencijal modela stvara se dugoročno i održivo društvo zasnovano na znanju, koje egzistira u ravnoteži sa prirodom.

Zaključak

Ekonomija znanja podrazumeva usklađenu umreženost svih aktera nacionalnog inovacionog sistema. Zaostajanje jednog od njih dovodi do zastoja u svima ostalima, jer se nalaze u tesnoj povratnoj sprezi, tj. odnosima direktne međuzavisnosti i međusobne uslovljenosti.

Potvrđena je hipoteza H1, da inovacioni makromenadžent u uslovima privređivanja koji omeđuju izazovi i dometi ekonomije znanja predstavlja nezaobilazan instrument u realizaciji savremenih strategija ekonomskog razvoja. Inovacioni makromenadžment objedinjuje aktivnosti naučne tehnološke i industrijske politike u čijoj je nadležnosti oblikovanje makroekonomskog

ambijenta koji pogoduje unapređenju inovativnosti pojedinih ekonomskih aktera i nacionalne ekonomije u celini.

Na osnovu ekspliciranih stavova brojnih autora u radu, može se zaključiti da je stav po kome koncept NIS-a predstavlja osnovnu gradivnu komponentu inovacionog makromenadžmenta u potpunosti prihvatljiv (H2 hipoteza).

Činjenica je da spiralni modeli stimulišu interaktivnost aktera u složenim aktivnostima kreiranja i implementacije znanja u nova inovaciona rešenja. Mogu se označiti nezaobilaznom platformom umrežavanja aktivnosti učesnika nacionalnog inovacionog sistema, što pretstavlja potvrdu hipoteze H3.

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INNOVATIVE MACROMANAGEMENT IN THE KNOWLEDGE ECONOMY

Srdjan Milićević [18], Vladimir Kostić[19], Maja Stošković[20]

" Soul economy knowledge is continuous striving for innovation ".

Lee Tein, Academy social science China

Abstract

After explaining the key postulates of the knowledge economy paradigm, the paper looks at the importance of unifying national policies of scientific, technological and industrial development in the form of innovative macro-management. A review has been made on the instruments offers demands and protection using which the entrepreneurial state works on the promotion national innovation Authors represent the opinion that the main building block of innovation macro-management is the concept of the national innovation system (NIS), whereby the unification platform activities academic community economy state and society represent so called spiral models innovation Base these model makes learning communicating and cooperation as a fundamental social process, on the one hand, and the growing network of activities of all participants in the creation of new knowledge and especially in the commercial valorization of knowledge into innovations, on the other hand.

Keywords: *knowledge economy, innovation macromanagement, NIS, spiral models of knowledge creation and innovation.*

JEL*: A13; E14; O30; D02;*

Introduction

Theoretically foundation concept macroeconomic management it is possible to find in the attitude Peter Drucker by coma management means practice skill art and science management processes on different levels organization economy and society (Drucker, 1964). Like the system management production entities

[18] Assistant Professor Srdjan Milićević, PhD, Metropolitan University in Belgrade, Faculty of Management, Tadeusa Košćuška 63, 11185 Belgrade, Republic of Serbia, Phone +381 64 11 62 902, E-mail: srdjan.milicevic@metropolitan.ac.rs

[19] Senior lecturer Dr. Vladimir Kostić, Academy technical educational study Section Vranje Filipa Filipovića no. 20, 17000 Vranje Republic of Serbia Phone +381 17/21-889 E-mail: vladimir.kostic @ akademijanis.rs

[20]Dr. Maja Stošković Privredna chamber Serbia Resavska 13 - 15, 11000 Belgrade, Republic of Serbia Phone +381 11 41 49 624, E-mail: maja.stoskovic@edu.rs

management appears in the nineteenth while your own full affirmation acquired in the twentieth century

Development management during the last ones about thirty year follows highways changes in the economy and society which are the most common covered by the expression paradigm a economy knowledge A key feature of the knowledge economy is the emphasized reliance of economic activities on the creative abilities of people, while at the same time they are less and less based on the use of physical capital and natural resources (Florida, 2002). In the new economic conditions, the creators of national economic development strategies are paying more and more attention to the creation and diffusion of new knowledge and the most successful commercial valorization of knowledge into innovations.

In principle, it is possible to distinguish between micro-management and macro-level management. The content coverage of the category of micromanagement extends to numerous and increasingly complex dimensions of managing the functioning of economic subjects, while the content of macromanagement can in a certain sense be identified with numerous activities of planning and managing economic flows in the national economy. " Macroeconomic management should be understood as a set of measures and activities undertaken by the creators of economic policy and, more broadly, social development policy, alone or in cooperation with one of the many economic entities in conceiving and realizing the defined goals of socio-economic development" (Cvetanović & Novaković 2018: 131). At the same time it is not allowed one moment to lose from vision the fact that economically Life takes place in the microeconomic entities and that it is fundamental premise efficiency politics management development national economy success functioning hers companies

The importance of knowledge for economic processes has radically increased in recent years. Its commercial valorization into innovations has been promoted as an essential driver of labor productivity growth and improvement of competitiveness at all levels Atkison & Ezzel 2014 Nijkamp & Siedschlag, 2011). This resulted in the affirmation of intellectual capital as a driver of labor productivity and improvement of competitiveness. On the macroeconomic level, there was an affirmation of new theoretical concepts such as this one theories economic growth Romer, 1986; Lucas, 1988 and evolutionary - innovative approach in the research of economic phenomena Nelson & Winter 1982), n ov e the concept is national wealth Sults 1981), new public management Osborne & Gaebler 2000 The theoretical foundation of these approaches is the decisive position of their creators that the production and commercial valorization of knowledge represents the main driving force of the development of market economies (Wickham, 2001).

The common thread of all these theoretical approaches is the challenge of the key ones the starting point of neoclassical economic theory in terms of existence

marketable balance inevitability manifestation of the law decreasing yield factors production exogenous nature innovation (Fagerberg, 2001). On a certain the way and alone concept innovative management implicitly implies negation mentioned theoretical points of departure neoclassical theorists Specifically newer approaches they point out far wider justification state intervention in the economy and not only in the case of neutralization marketable shortcomings How are considered neoclassical economists possibilities manifestation non-decreasing yield factors production thanks to use knowledge like practically unlimited production resource endogenous nature innovation which implicitly and explicitly justifies active role state in planning management and control innovative activities economic actors Mazzucato 2014; Mazzucato & Semieniuk 2017). Newer theories of economic development assume that innovations represent the internal outcome of public and private investments in human capital, investments in research and development areas of production, as well as the design of the wider social environment in which economic subjects function Nelson & Winter, 1982).

Among the most important drivers of economic development in modern conditions, the system of education and knowledge acquisition stands out in the literature basic and applied research NIS competence (Freeman, 1987; Lundvall, 1992; Nelson, 1993). Nevertheless, according to the almost undivided opinion of analysts, the decisive role in shaping the conditions which favor the long-term sustainable growth and development of individual countries and their regions success creation and commercialization knowledge in innovation e (Švarc, 2009; Leković, 2018). An important one platform in processes creation and commercial valorization knowledge into innovation represents NIS- based on the spiral engl. *helix* models connection academic community production state and social communities Ješić 2015).

The aim of the work and the methodology used

Bearing in mind the previously presented statements, the objectives of the paper are as follows a) explanation of the key characteristics of the knowledge economy, b apostrophizing and integrative character innovative macromanagement in the sense of unification content politics scientific technological and industrial development on the level individual national economy c) indicating the importance of the concept of NIS in innovative macromanagement and) analysis places spiral model creation knowledge and his commercialization into innovations in the economy knowledge

The following research hypotheses were established:

H1: Innovation macromanagement in economic conditions that limit the challenges and scope of the knowledge economy is an indispensable instrument in the realization of modern economic development strategies.

H2: The supporting building element of innovation macromanagement in the

knowledge economy is the concept of NIS.

H3: Platform mutual coordination activities NIS actors represent spiral models creation knowledge and his commercial valorization into innovations

It is in operation using method analysis and compilations presented unifying dimension innovative macromanagement in the sense of connection politics scientific technological and industrial development countries in the economy knowledge Using descriptive method is explained in more detail Idea of the concept of NIS, which is essential importance for understanding not only essence innovative of macromanagement already and unsustainability attitudes neoclassical economic theorists on the matter exogenous nature categories technological change In order to avoidance more detailed descriptive description essence and individual elements constructional design spiral model creation and commercialization knowledge into innovation graphic was used explication connection theirs key actors

Results work with discussion

Paradigm economy knowledge

Knowledge represents a " set fact information and skill acquired education or experience with goal theoretical or practical understanding and solutions problems It becomes valuable property necessary in all spheres decision-making Contributions development individual organization and society " (Drašković, 2010: 84). The paradigm of the "knowledge economy" in this century is an inspiring research topic in many social sciences. Economy knowledge is formed and wider on the base of use knowledge like unique unlimited and independent factors production which is impossible substitute others resources Knowledge is in it turns into economic goods and income in the majority economic activities and not only in those who is are directly associated with the highest technologies Everything is being organized more turn into innovative ones pri why like subject innovations become not only products and technology rather and ways organizations and mutual dealing with customers " (Drašković, 2010: 84) Although the concept itself still does not represent a fully rounded entity, a large number of economic analysts believe that understanding its essence and scope is the starting point for looking at the leading social and economic changes in the world during the last twenty years. Beraha & Djuricin 2022

Beginning in the 1990s, the development of new, and above all, information and telecommunication technologies acted in the direction of a fundamental transformation of the structure of the world economy. Environments that stepped deeper into the development of the knowledge-based economy showed incomparably better macroeconomic performance compared to countries that were late in the complex processes of digitization of the economy and society Huggins & Izushi 2007)

The affirmation of the knowledge economy paradigm led to a changed approach in economic research, which until that time was dominantly based on the analytical instrumentation of the industrial economy. The extent and nature of these changes is presented in Table 1.

Table 1: Basic premises of the economic theory of the industrial society and the knowledge economy

Industrial society	**Economy of knowledge**
Theoretical postulates	
▪ exogenous nature of innovation ▪ diminishing returns ▪ market equilibrium	▪ endogenous nature of innovation ▪ non-decreasing (constant or increasing) returns ▪ market inefficiencies (positive and negative externalities, technology and knowledge spillovers)
Factors of production	
▪ physical capital (equipment and construction facilities) ▪ human work ▪ land	▪ education ▪ Research & Development ▪ technology
The basis of competition in the market	
▪ costs ▪ prices	▪ knowledge ▪ innovations
Expediency of state interventions	
▪ State interventions are basically necessary	▪ expediency of macroeconomic management

Source: Authors

Economy knowledge she marked combining and economic ones theory based on laws markets and utility goods with intangible to them values ma " In the economy based on the knowledge many companies create acquire and they maintain competitive advantage on turbulent the market thanks to innovations " Miletić Trajković & Mrdak 2021: 165) Competitive advantage is shifting from the physically them according to intangible to them and from visible them according to invisible to their agents Knowledge valorized in game innovation decisive role in creation economic values Unlike the industrial economy, where state intervention in the market was questionable, in the knowledge economy there is evidence of the need for macroeconomic management of key economic changes.

Integrative nature innovative of macro management

Looking at the activities and potential scope of the modern state in the fields of knowledge creation, their identification with the national innovation policy, i.e. innovation macro-management, is present in the literature. The combination of a wide range of interventions by the modern state in the domains of development of science, technology and industrial production creates a fertile innovation climate which in the end can be of importance in the process of increasing the innovation potential of companies and countries

Innovative Macromanagement is an increasingly important means of proactive action by the state in the direction of connecting knowledge and entrepreneurship, that is, connecting the scientific research sector with parts of the economy essential for the process of knowledge capitalization. By him contemporary country strives to integrate the management of scientific technological and industrial research by developing into a unique policy of knowledge creation and its valorization into innovations

The theoretical foundation of innovative macro-management understood in this way is evolutionary economic thought. Contrary to the messages of neoliberal economic theory, evolutionary thought states that the supporting role of the state in the field of scientific, technological and industrial development is a much-needed activity that is far from reducing market inefficiencies, as insisted on by economists of neoclassical provenance. On the contrary, the action of the state to improve the innovativeness of economic subjects, in addition to creating an institutional environment that favors the creation of knowledge and especially favors its commercialization into innovations, implies the integration of knowledge, innovation and entrepreneurship as key drivers of the growth and development of companies and countries in the knowledge economy. In addition to the scientific and technological infrastructure, "educational policy, market competition policy, information and communication infrastructure" have an important influence on the design of that environment (Schwartz, 2009: 23). In this context, innovation macro-management can be defined as an amalgamation of the scientific, technological and industrial policy of individual countries.

It's a big number instruments whose by using country seeks to improve innovation in national scales In principle it is possible to make the difference between instruments offers demands and instruments regulation Cvetanović 2002)

Instruments offers are based on on the financial material and infrastructural support States promotion innovative skills individual economic subjects For example public sector was key to a smooth functioning basic and not rare and for many applied research and for providing financial start -up funds many high risky projects especially in the early stages phase theirs realizations In lies in research and development activities encourage growth of innovation and specific application in innovative solutions Đuričin & Beraha 2021)

Instruments the demands are reflected in the huge public purchases products new ones technology not rarely in the initial phases theirs of origin Different said public sector is directly acted on the creation markets many innovative products big and safe purchases products new ones technology (Perez, 2013).

The third a group instruments innovative of macro management are instruments protection and regulations They encompass numerous legal and regulative solutions via which are on indirect the way it works to create an environment favorable for the creation and widest diffusion of innovations

The importance of the concept of NIS for the modern macro-management of innovation

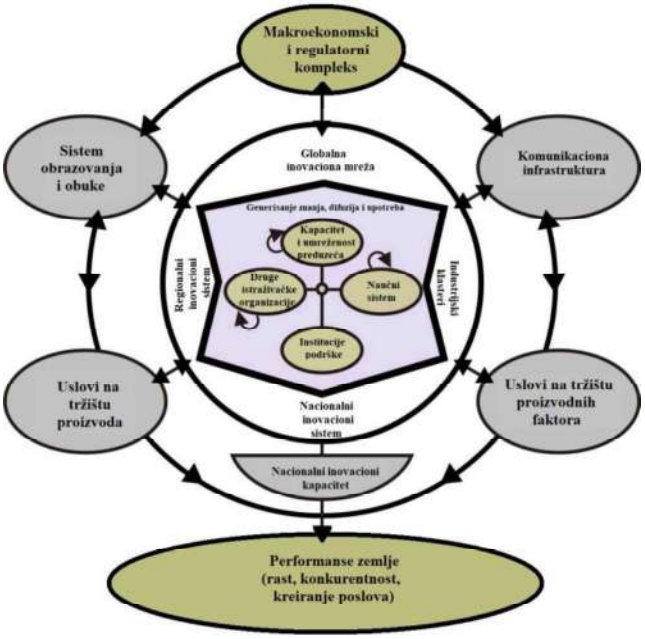
At the epicenter of innovative macro-management is the concept of NIS. The origin of this concept is linked to the British economist Freeman Freeman 1987 1995 the Swedish economist Lundvall Lundvall 1992 and the American neo - evolutionary economist Nelson Nelson 1993). These researchers had a different view of the origin and diffusion of innovations compared to the neoclassical approach Soete 2010 C o nc e pt of NIS apostrophes the importance of interaction between actors in the innovation process and points to different forms of innovation processes shaped by numerous social institutional and political factors Fagerberg & Vespagen 2009). The scope of quality NIS as a framework through which to innovate macro management manifests own action on the growing commercial valorization knowledge into innovation in essence are determined factors of endogenous nature The concept of NIS is directly related to the Schumpeterian approach perception of entrepreneurship as expressive o b character a innovative economic behavior The same apostrophizes the presence of elements of risk and uncertainty in the processes of knowledge creation and its commercialization of innovation.

The classic approaches to the research of life innovation are more focused on the analysis of the activities of life research However neo-evolutionary economists rightly note that it is not only research results that are important for the emergence and diffusion of innovation Significant support for the emergence of innovations is represented by relations between producers and consumers the availability of appropriate equipment and the training of employees Lundvall 1992). In short innovations occur both in the production process and in distribution and consumption Godin 2006a 2006b

It is believed that innovation processes take place dominantly in the path of inte raction Int e r a ctiv ost apostrophes importance learning and adaptation of economic actors to the ongoing changes in the environment Successful accounting systems design a favorable environment process creation new ones knowledge and especially its commercial valorization in innovation Such systems are

characterized by pronounced mobility of resources and different forms of capital (Figure 1).

Figure 1: Links between key NIS actors



Source Schrempf, Kaplan & Schroeder 2013 9.

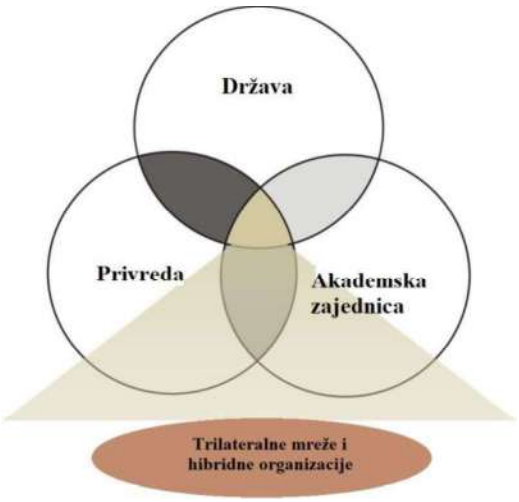
Efficiency and effectiveness NIS is largely a function of the success of the exchange and circulation of knowledge between individuals enterprises and sectors i.e. production and diffusion is the knowledge that makes possible its production exploitation and market valorization Although the dominant forms of production transfer and exploitation of knowledge are specific to each national innovation system it is possible in modern production and social conditions to recognize the fact that investments in research and development activities, education and the acquisition of various work skills are important for the success of companies

Spiral models creation knowledge and his commercialization into innovations

Spiral models indicate on the growing importance networking and intersectoral cooperation of all actors innovative system involved in the process creation and valorization knowledge into innovation Etzkowitz & Leydesdorff 2000 One Number The author it seems with full right is of the opinion that spiral models innovation represent basis of modern NIS Ješić 2015). Others however these models put in the same flat with concept of NIS, noting that in contrast from the him in whom dominant role and importance has economy i.e. companies spiral models accentuate tight connection and networking sphere academic community

economy and States with equally importance in the national innovative network Pokrajac 2016). "In the economy knowledge creation bases knowledge depends from the synergy achieved between the three main ones actors in the economy academic community world business and government Every an actor can to be associated with a certain element economics universities are responsible for creating novelties business companies they create economic wealth and the government is responsible for management interactions among actors but also responsible for compliance social rules ie legality in work " (Pokrajac, 2016: 120) By the other in words "the triple model spirals stimulates actors on the cooperation in outdoor work space circulation invention knowledge and innovation Because huge synergistic potential which is realized cooperation of all actors this model is not uncommon in the professional literature luck named sleeping giant To be that the sleeping giant woke up every the actor must be trained for efficient interactions which suggests that weakness someone from the participants leads disintegration and the whole model triple spirals " (Pokrajac, 2016: 120)

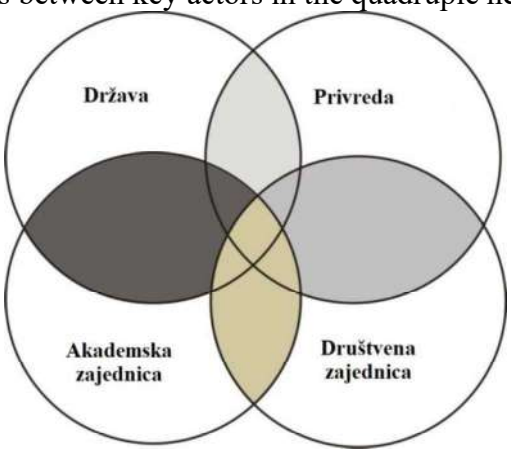
Figure 2. Trilateral connectivity in the triple helix model



Adapted from: Etzkowitz & Leydesdorff 2000: 111.

The quadruple *helix* model is based on the assumption *that the* academic *community the economy the state and society function* on the principles of open circulation knowledge learning process communication and human cooperation Figure 3 Such a spiral relationship for the result have multiple effects in the processes of knowledge creation and its capitalization into innovations Carayannis & Campbell 2006

Figure 3. Connections between key actors in the quadruple helix model

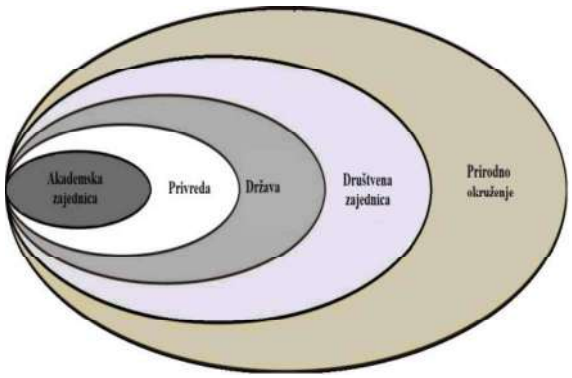


Source: Leydesdorff & Meyer, 2006.

In looking at the structure and logic of functioning of the quadruple spiral model, researchers emphasize the network of overlapping activities of all actors in the model. It is complementary factor relations quadruple helixes enable creation flexible Mr of the NIS system which makes a significant contribution to the achievement sustainable Mr development economy, i.e. knowledge society

Quintiple helix *model* tries to relativize many contradictions of the paradigm of sustainability The focus of the model is the way in which socio-ecological change can improve the production of knowledge and its valorization into innovations Carayannis Barth & Campbell 2012). This model complements the quadruple helix model with a fifth subsystem – the natural environment (Figure 5)

Figure 4. Model of the five-fold helix

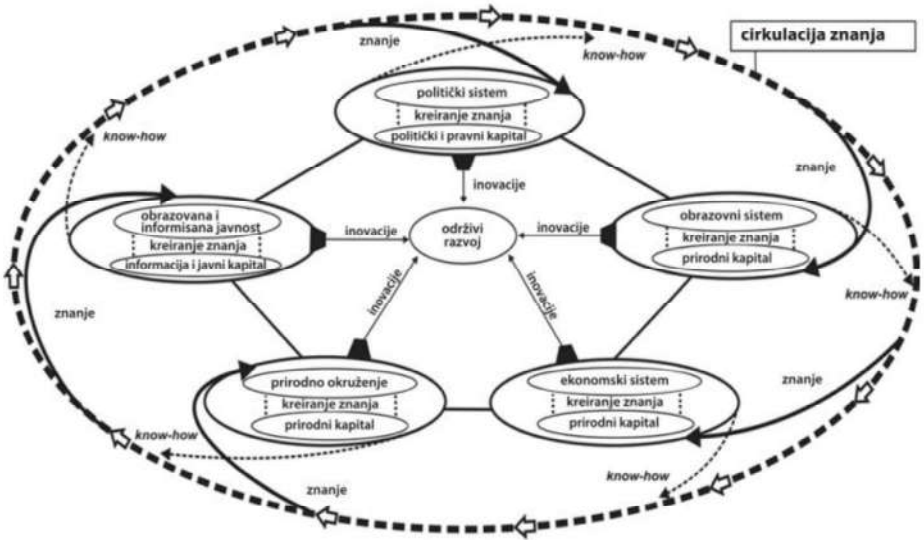


Source Carayannis, Barth & Campbell 2012 6

On page 5, the functions of the five-fold helix model are presented. It is noted that in a peculiar way it indicates the fact that knowledge possesses the qualities and functions of inputs and outputs for each subsystem considered individually. Entering as an input in one subsystem, knowledge comes out as an output in

another subsystem, which further represents an input for the next subsystem, through continuous circulation and creation of innovations. In this way, the circulation of knowledge continuously acts in the direction of stimulating the process of creating new knowledge and its commercialization into innovations Carayannis Barth & Campbell 2012).

Figure 5: Functions model fivefold spirals



Source Carayannis, Barth & Campbell 2012 7.

The model shows that investing in knowledge and promoting knowledge creation creates key impulses for innovation. By initiating small but continuous steps through the synergistic potential of the model, a long-term and sustainable society based on knowledge, which exists in balance with nature, is created.

Conclusion

The knowledge economy implies coordinated networking of all actors of the national innovation system. The lag of one of them leads to a lag in all the others, because they are in a tight feedback loop, i.e. relations of direct interdependence and mutual conditionality.

Hypothesis H1 was confirmed, that the innovative macromanager in economic conditions that limit the challenges and scope of the knowledge economy represents an indispensable instrument in the realization of modern strategies of economic development Innovation macromanagement unites the activities of scientific, technological and industrial policy, whose responsibility is shaping the

macroeconomic environment that favors the improvement of the innovation of individual economic actors and the national economy as a whole

Based on the explicit positions of numerous authors in the paper, it can be concluded that the position according to which the concept of NIS represents the basic building component of innovation macromanagement is fully acceptable (H2 hypothesis).

The fact is that spiral models stimulate interactivity actors in complex activities creation and implementation knowledge into new innovative ones solutions I can tag myself inevitable platform networking activities participants national innovative system what represents a confirmation of hypothesis H3.

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