

# Razvoj poslovnointeligenčnih sistemov v slovenski javni upravi – študija primera

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## IZVLEČEK

Poslovnointeligenčni sistemi (BIS) postajajo pomemben dejavnik uspešnega poslovanja organizacij. Za njihovo uvajanje je v literaturi predstavljeno veliko metodoloških pristopov, področje uporabe pa je v pretežni meri gospodarstvo. Zaradi vseh koristi je smiselna uporaba BIS tudi v javni upravi, kjer pa je na tem področju manj izkušenj in znanstvenih raziskav. Članek obravnava primernost uporabe metodologij za razvoj poslovnointeligenčnih sistemov v javni upravi, pri čemer smo ob upoštevanju specifičnih lastnosti BIS preučili praktični primer v eni od organizacij javne uprave, kjer so za razvoj BIS uporabili splošno metodologijo razvoja informacijskih sistemov, prvotno razvito za gospodarstvo. Kot raziskovalna metoda je bila uporabljena študija primera, s katero smo ovrednotili uporabljeno razvojno metodo in opredelili osnove za prihodnje raziskave na področju razvoja BIS v javni upravi. Z raziskavo je bilo ugotovljeno, da uporabljene metode razvoja, ki so bile razvite za informacijske sisteme v gospodarstvu, ne upoštevajo specifičnih lastnosti in razlik javne uprave in sistemov BIS, zato bi jih bilo treba ustrezno dopolniti in prilagoditi.

*Ključne besede:* poslovnointeligenčni sistem (BIS), javna uprava, metodologija razvoja BIS, študija primera

*JEL:* H83, M15

## 1 Uvod

Poslovnointeligenčni sistemi (BIS) postajajo pomemben dejavnik v poslovanju organizacijskih sistemov v sodobni družbi, njihov temeljni namen pa je analiziranje in preučevanje poslovnih procesov (Elbashir, Collier, Sutton, Davern, & Leech, 2013). BIS je opredeljen kot informacijski sistem (IS), ki zagotavlja kakovostne informacije v dobro oblikovanih podatkovnih zbirkah in omogoča uporabnikom učinkovite analize in intuitivne predstavitve takšnih informacij, ki so potem podlaga za izvajanje ustreznih aktivnosti oziroma

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odločitev (Popovič, Hackney, Coelho, & Jaklič, 2012). Organizacije se odločijo za BIS, ko potrebujejo izboljšave informacijskega procesa oziroma drugačen način zagotavljanja informacij. Temeljno vodilo vzpostavitve BIS je izboljšava kakovosti informacij, kar je dosegljivo z boljšim dostopom do relevantnih podatkov, združevanjem podatkov iz različnih virov in z interaktivnim dostopom do teh podatkov (Popovič, Turk, & Jaklič, 2010).

BIS se je v preteklosti praviloma uvajal najprej v gospodarstvu, zaradi česar je bilo razvitih več metodoloških pristopov za razvoj BIS (Williams & Williams, 2007; Moss & Atre, 2003), ki so vsaj implicitno namenjeni razvoju v gospodarskih organizacijah. V organizacijah javne uprave je na tem področju manj raziskav, kljub temu pa je vse večje zanimanje za razvoj in uporabo BIS tudi tam (Gadda & Dey, 2014; Boselli, Cesarini, & Mezzanzanica, 2011), ne glede na mogoče razlike in specifične lastnosti. Na podlagi teh predpostavk bomo v članku raziskali primernost uporabe metod za razvoj BIS iz gospodarstva v javni upravi glede na specifične lastnosti in razlike, ki obstajajo med obema področjema.

Namen prispevka je ovrednotenje metodologije razvoja poslovnointeligenčnih sistemov v javni upravi glede na dejstvo, da je bila metoda prvotno namenjena za gospodarske organizacije. Zato smo preučili primer uporabe metode razvoja BIS v organu javne uprave, ki je potekala v sklopu obsežne prenove celotnega IS. Ob tem bomo upoštevali tudi specifične lastnosti BIS glede na IS, ki jih lahko zasledimo v literaturi. Cilj prispevka je podati objektivno oceno primera uporabe metodologije razvoja BIS s preučitvijo ugotovitev ekspertov, ki so sodelovali pri razvoju, in podati predloge za izboljšave na podlagi rezultatov opravljene študije. Hkrati bomo pregledali tudi nekatere druge teoretične pristope na področju preučevanja BIS v javni upravi. Pri raziskovanju bomo uporabili študijo primera kot eno od oblik kvalitativnih raziskovalnih pristopov, ki je najprimernejša za tovrstno raziskavo v ocenjevalnih študijah uvajanja informacijskih tehnologij (Kaplan & Maxwell, 2005). Rezultati raziskave pomenijo novo spoznanje k metodologijam razvoja poslovnointeligenčnih sistemov v javni upravi.

V članku bomo najprej predstavili teoretična izhodišča na področju metodologij razvoja BIS, v nadaljevanju pa bodo opredeljene raziskovalne metode in potek študije primera. V osrednjem poglavju prikažemo rezultate študije, ovrednotimo preučevano metodologijo, prispevek pa zaključujejo diskusija in poglavitne ugotovitve raziskave. Članek tako ugotavlja, da je v javni upravi pri uporabi obstoječih splošnih in namenskih metod razvoja BIS, razvitih za gospodarstvo, potrebno upoštevati specifične lastnosti in razlike in jih temu primerno prilagoditi in dopolniti.

## 2 Teoretična izhodišča

V literaturi so opredeljene metodologije razvoja informacijskih sistemov v javni upravi (Ishak & Alias, 2005; Goldkuhl & Röstlinger, 2010; Haklay, 2002), ki predstavljajo splošen pristop k razvoju IS. Metode so v tem kontekstu

opredeljene s predpisanim življenjskim ciklom (Aydin, Harmsen, van Slooten, & Stegwee, 2004; Qumer & Henderson-Sellers, 2008; Brinkkemper, 1996), podobne navedbe pa najdemo tudi v literaturi na bolj specifičnem področju BIS (Moss & Atre, 2003; Williams & Williams, 2007). Ob tem opozarjamo na možnost, da splošne metode razvoja IS niso popolnoma ustrezne za razvoj BIS v javni upravi, čeprav je mogoče zaslediti tudi takšen pristop (Hartley & Seymour, 2011). Pri BIS je kot ključni dejavnik posebej izpostavljena ekonomska komponenta donosnosti naložbe (Williams & Williams, 2007), zato priporočamo pri uvajanju BIS v javno upravo uporabo namenske metodologije. Nekateri študije določijo posebnosti BIS glede na IS (Popovič et al., 2012), pri čemer izpostavljajo predvsem razlike pri vpeljavi sistemov po tehnološki fazi. Druga literatura navaja različne uporabnike BIS, prepozna drugačno zbiranje potrebnih podatkov, njihovo poizvedbo in pridobivanje iz zunanjih virov, opredeli različno stopnjo zanesljivosti in pravilnosti pridobljenih podatkov ter ugotavlja drugačne procedure pri uporabi samih sistemov (Grublješič, 2014).

Metodologija razvoja BIS (Moss & Atre; metodologija *BI Roadmap*, 2003; Williams & Williams; *BI Pathway*, 2007) je predstavljena kot kompleksen sistem, zato sta kompleksna tudi njen razvoj in vpeljava v uporabo. Opisana je kot večfazni razvojni cikel z možnostjo cikličnega ponavljanja, pri čemer je potrebno slediti ključnim dejavnikom uspeha, izbrati ustrezno tehnološko rešitev, uskladiti podatkovne baze, testirati in izobraževati uporabnike ter slediti postavljenim ciljem (Gangadharan & Swami, 2004). Zaradi ugotovitev iz literature (Decision path consulting, 2008) v kontekstu našega preučevanega primera pa lahko predpostavimo, da so obstoječe metode razvoja BIS namenjene predvsem za uporabo v gospodarstvu, zato obstaja dilema, ali so te metodologije ustrezne tudi za uporabo v okolju javne uprave. To je nekoliko drugačno organizacijsko okolje kot v gospodarstvu (Rainey & Bozeman, 2000; Rocheleau & Wu, 2002; Nutt, 2005; Bannister, 2001; Bretschneider, 1990; Ariyachandra & Frolick, 2008; Ward & Mitchell, 2004). Najpomembnejše razlike in specifični dejavniki v javni upravi so vplivi politike in zunanjega okolja, upoštevati pa je potrebno tudi vplive vodstvenega menedžmenta pri uspešni uporabi obstoječih metod razvoja BIS v javni upravi.

V kontekstu teh dejavnikov bomo primerjali našo raziskavo z razvojem BIS v javni upravi, kjer je opisan pristop večfazne vpeljave BIS z uporabo uravnoteženih kazalnikov (Niehaves & Müller-Wienbergen, 2007). Ti so predstavljeni v obliki opredelitve deležnikov in postavitve jasne organizacijske vizije, opredelitve merljivih ciljev in akcij ter vzpostavitvi kontrolinga za zagotavljanje učinkovitosti BIS. Ta dejstva nam bodo omogočila primerjavo z našimi ugotovitvami na področju BIS, hkrati pa bomo lahko dodatno ovrednotili teoretične predpostavke iz literature, ob tem pa postavili relevantno osnovo za nadaljnje preučevanje razvoja BIS v javni upravi.

### 3 Metode raziskovanja

Študija primera kot metoda je način preiskave empiričnega problema s primernim naborom predpisanih postopkov, predstavljena pa je kot mehka metoda raziskovanja zaradi možnosti odstopanja od predpisanih postopkov. V študiji primera se preiskovalec sooča z definiranjem študije same, s pridobivanjem relevantnih podatkov in z obdelavo zajetih podatkov (Yin, 2003). Študija primera je kot način raziskovanja na področju uvajanja informacijskih sistemov okarakterizirana kot poglobljena študija artefakta v poslovnem okolju (Hevner, March, Park, & Ram, 2004), kar nam dodatno potrjuje primernost uporabe za naše raziskovanje. Študijo primera kot pristop na področju preučevanja BIS v javni upravi navajajo tudi v drugi literaturi (Gadda & Dey, 2014). Naša študija primera bo sledila predlogu večfazne metode iz literature (Yin, 2003), pri čemer bomo preučili primer uporabe metode razvoja IS, ki je bil uporabljen za razvoj BIS v javni upravi.

Upošteva teoretična izhodišča smo v okviru študije primera ocenili uporabljeno metodologijo razvoja BIS v javni upravi. Ekspertne ugotovitve smo analizirali glede na predhodno zbiranje podatkov, pri čemer smo pozornost posvetili tistim trditvam, ki so ovrednotile uporabljeno metodologijo v kontekstu specifičnih lastnosti javne uprave in obenem tudi posebnosti BIS.

V študiji primera smo zbrali podatke predvsem z intervjuji, ki so bili glavni vir podatkov za kasnejšo obdelavo. Na področju preučevanja BIS v javni upravi poteka pridobivanje podatkov predvsem z intervjuji deležnikov in ekspertov, ki so sodelovali pri projektih (Sapp, Mazzuchi, & Sarkani, 2014). Hkrati smo pregledali tudi projektno in ekspertno dokumentacijo o poslovnih, tehničnih in splošnih zahtevah postavitve integralnega informacijskega sistema organizacije v javni upravi (DURS, 2014), ki je bila zbrana med procesom razvoja BIS, in preučili arhivske zapiske o opažanjih nekaterih drugih sodelujočih uporabnikov pri nastanku BIS, na podlagi katerih smo pridobili nekatere manjkajoče informacije. Pri analitičnih postopkih smo preučili podane trditve ekspertov za vsak posamezni odgovor, v nadaljevanju pa je bila analiza odgovorov sorazmerno manj zahtevna, saj so bila vprašanja usmerjana in zelo konkretna. Po končanih intervjujih, pregledu dokumentacije in arhivskih zapiskov smo zbrana znanja primerno ovrednotili in filtrirali, da so postala ustrezna za nadaljnjo uporabo in dokončanje študije primera. Podatke smo analizirali glede na lastnosti javne uprave in specifike BIS, tako da smo trditve ekspertov povezovali z ugotovljenimi specifičnimi dejavniki iz relevantne literature. Naknadno smo preučili tudi povezave med neustreznimi lastnostmi uporabljene metode in ekspertnimi zaznavami problematike metode razvoja BIS v javni upravi. S povezovanjem relacij med obema analizama smo dosegli primerno količino znanja za priporočila pri nadaljnjem preučevanju te problematike.

Študijo smo opravili v organizaciji v javni upravi (takrat Davčna uprava Republike Slovenije, sedaj Finančna uprava RS), ki se je odločila za celostno

prenovo informacijskega sistema. Zaradi obstoječih parcialnih rešitev pretežno zastarelih sistemov so se po temeljiti razpravi in javnih razpisih odločili za zunanjega ponudnika, pri čemer so predpostavili, da bo prenova trajala v več sklopih skozi daljše časovno obdobje. V sklopu ponujene programske opreme SAP je bil predstavljen tudi modul poslovnointeligentnega sistema, katerega lastnosti so bile predstavljene državnim organizacijam; ta se je odločila za uporabo tega modula. Proces prenove informacijskega sistema organizacije v javni upravi, v sklopu katerega je bil vzpostavljen poslovnointeligentni sistem, je potekal v letih 2010 do 2012. Projekt prenove IS v predstavljeni organizaciji je potekal po metodologiji ASAP (angl. *Ascendant SAP*), ki kot splošna razvojna metodologija informacijskih sistemov večjih organizacij temelji na programski opremi SAP, vsebuje pa tudi možnost zasnove in uporabe poslovnointeligentnih sistemov (Deng & Chi, 2013).

Zbiranje podatkov z intervjuji in pregledom dokumentacije ter arhivskih zapiskov je potekalo v organu v sestavi javne uprave v letu 2013 in 2014. Organ ima več tisoč zaposlenih; oddelek za informacijsko tehnologijo, v katerem smo izvajali intervjuje, pa je v času opravljanja študije imel okoli 90 zaposlenih. Opravili smo tri strukturirane intervjuje z eksperti na področju poslovnointeligentnih sistemov, ki so vodili vse pomembnejše procese pri uporabi metode razvoja BIS; zaradi nekaterih kadrovskih omejitev so bili ti trije eksperti edini sodelujoči v vseh procesih. Intervjuji so potekali na delovnem mestu intervjuvancev, celoten postopek je bil posnet na elektronski medij s privolitvijo udeležencev za potrebe kasnejše celovite obdelave rezultatov. Po potrebi bo opravljen naknaden prepis posnetka v papirni obliki za morebiten vpogled intervjuvancev v pravilnost njihovih navedb. Postopek intervjuvanja je nadziral en preiskovalec, pri čemer je bil prvi intervju opravljen z vodjo razvoja BIS, druga dva pa s strokovnimi sodelavci pri uporabi metode razvoja BIS z namenom verificiranja rezultatov, pridobljenih v prvem intervjuju. Pričakovana dolžina intervjuja je bila določena v okviru trajanja učinkovitega sodelovanja vseh vpletenih, kar smo ocenili v razponu ene ure in pol do dveh ur. Pregledana projektna dokumentacija je obsegala poslovne zahteve, tehnične zahteve in splošne zahteve (DURS, 2014).

Z intervjuji smo želeli pridobiti informacije o uporabljeni metodi razvoja BIS in o tem, kakšen je njen življenjski cikel, kako so eksperti pristopili k izvedbi posameznih faz in kakšne probleme so zasledili pri uvajanju BIS. Upoštevanje ekspertnih mnenj pri natančni opredelitvi zahtev, na podlagi katerih je mogoče definirati celoten življenjski cikel, je ključni dejavnik uspeha v tovrstnih projektih (Coffey, 2012). Zaradi uporabljene metode razvoja BIS iz gospodarstva nas je nadalje zanimalo upoštevanje specifičnih razlik med javno upravo in gospodarstvom oziroma njihov morebitni vpliv pri uporabi te metode. Hkrati smo preverili tudi posebnosti BIS v kontekstu IS glede na splošnost uporabljene metode. Na podlagi izkušenj ekspertov smo oblikovali nadaljnji postopek raziskovanja, pri čemer smo dobili predloge za izboljšave v nadaljnji uporabi metode razvoja BIS, ob tem pa je mogoče oblikovati

tudi priporočila za razvoj tovrstnih metod v prihodnosti. S povzetkom pridobljenega znanja lahko ovrednotimo metodo razvoja BIS v javni upravi in potrdimo oziroma ovržemo obstoječe specifike in razlike med gospodarstvom in javno upravo, s tem pa omogočimo uspešnejši metodološki razvoj BIS javne uprave v prihodnje. Preučitev ekspertne dokumentacije in arhivskih zapiskov nam pomeni vpogled v teoretično osnovo celotnega razvoja BIS in pregled empiričnih izkušenj ekspertov pri uporabi metodologije, glavno znanje pa smo pridobili predvsem iz intervjujev. Tematika vprašanj v intervjujih je predstavljena v tabeli 1.

**Tabela 1: Vsebina zbiranja podatkov opazovanja z intervjuji**

1. Uporabljeni metodološki pristop pri metodi razvoja BIS
2. Življenjski cikel metode razvoja BIS
3. Upoštevanje specifičnih razlik med javno upravo in gospodarstvom pri metodi razvoja BIS
4. Težave pri uporabljenih metodah razvoja BIS
5. Predlogi izboljšav in planirane aktivnosti v bodočih metodah razvoja BIS
6. Priporočila za nadaljnje preučevanje metode razvoja BIS
7. Ovrednotenje uporabljene metode razvoja BIS

#### 4 Rezultati študije

V opravljeni študiji primera so intervjuvanci v projektu prenove IS in vzpostavitve BIS uporabljali metodo ASAP, ki jo je predlagal zunanji razvijalec strojne in programske opreme pri prenovi celotnega informacijskega sistema. Metodološko so razvili BIS v petih stopnjah, ki so vključevale »projektno pripravo, načrt poslovnih procesov, realizacijo, sklepne priprave in uporabo z vzdrževanjem, kar predstavlja zaporedje, primerljivo življenjskim ciklom drugih metod«.

Na vprašanje o upoštevanju prepoznanih specifičnih lastnosti in razlik med javno upravo in gospodarstvom so eksperti odgovorili, da so le-te vplivale v takšni meri, da jim »še zmeraj povzročajo težave, predvsem zaradi pravne rigoroznosti javne uprave«. Ključni dejavniki uspeha pri metodologiji razvoja BIS so povezani s problematiko javne uprave, kar je razvidno tudi iz arhivskih zapiskov ekspertov. Glede na namembnost metodologije ASAP, ki je bila v osnovi predvidena za metodološki razvoj IS v gospodarstvu, intervjuvanci ne vidijo popolne ustreznosti uporabljene metodologije za potrebe javne uprave. Glavni problem uporabljene metode ASAP za intervjuvance je nedefinirano upoštevanje tveganja zaradi zunanjih dejavnikov, kar so v okolju javne uprave predvsem politični dejavniki. V tem kontekstu opozarjajo na specifične razlike glede na gospodarstvo, kjer je bila metoda ASAP prvotno razvita; tako smo dobili potrditev navedb iz relevantne literature o specifičnih dejavnikih javne uprave. Intervjuvanci so kot pomanjkljivost metode ASAP navedli tudi »neupoštevanje prenosa znanja«, zaradi česar se je zmanjšalo število kadrov

v nadaljnjem procesu razvoja BI; tudi to dejstvo je po njihovih navedbah posledica specifik javne uprave.

Za izboljšavo uporabljene metode razvoja BIS z upoštevanjem posebnosti javne uprave bi intervjuvanci prvo fazo življenjskega cikla dopolnili z »upoštevanjem okoljskih in političnih dejavnikov z doslednim upoštevanjem identifikacije problema in natančnejšo opredelitvijo ciljev ter prenosom znanja«, kar v uporabljeni metodi ni dovolj natančno opredeljeno zaradi specifičnih lastnosti javne uprave, ki vplivajo na sam metodološki postopek. Metoda ASAP po njihovem mnenju ne upošteva dovolj fleksibilnosti med razvojem samim, kar se da deloma odpraviti s cikličnim ponavljanjem. Zaradi specifičnih lastnosti javne uprave pa je ta del metodologije »težko izvedljiv zaradi zakonodajnih procedur«, čeprav časovni okvir ne bi povzročal prevelikih omejitev. Uporabljena metoda tudi ne predvideva posebne pozornosti »glede organizacijskega okolja«, kar lahko v začetnih fazah pomeni določen nivo negotovosti v okviru definiranja zahtev in planiranja. Zato tako intervjuvanci kot tudi sodelujoči uporabniki pričakujejo nekatere izboljšave uporabljene metodologije. V prvi fazi je potrebno poleg projektne priprave posvetiti posebno pozornost dejanskim potrebam organizacije, v katerem poteka metodološki razvoj BIS. Metodologi skozi celotni življenjski cikel ne smejo zanemariti tudi vpliva »notranjih (organizacijskih) in zunanjih (okolje) sprememb«, kar je prepoznana specifika javne uprave.

Na podlagi teh ugotovitev intervjuvanci pri planiranju aktivnosti metodološkega razvoja v prihodnosti ne morejo izključiti že prepoznanih težav v obliki »končanja projekta za vsako ceno« in drugih navedenih vplivov okolja, ki so posledica lastnosti področja javne uprave. Poudarjajo pa, da v gospodarstvu tovrstne težave niso izrazite v tolikšni meri, da bi vplivale na strukturo življenjskega cikla razvoja metodologij poslovnointeligentnih sistemov. V tem primeru so drugi uporabniki prav tako zaznali efekt »dokončanja za vsako ceno«. BIS ne omogoča vseh potencialnih prednosti, predstavljenih na začetku projekta, pojavljajo pa se nekatere težave pri delovanju sistema, ki v znatni meri vplivajo na učinkovitost pri uporabi BIS.

V naslednjem sklopu odgovorov lahko dobimo potrditev specifični lastnosti BIS, predstavljenih v teoretičnih izhodiščih, ki so nastali zaradi uporabe splošne metode razvoja IS ASAP. Pri uporabljeni metodi razvoja BIS so zaznali težave tudi pri pomanjkljivi opredelitvi življenjskega cikla, kar je privedlo do premalo razčlenjenih začetnih faz definiranja ciljev. Zaradi tega pride do »pomanjkanja komunikacij med zunanjimi razvijalci in uporabniki, v tem primeru predvsem pri nezadovoljivem definiranju potreb pri projektu« kot tudi »prehitrem zahtevanju izpolnjevanja ciljev«, zaradi česar postane »metoda manj uporabna«, kar so zaznali v težavah pri vpeljavi BIS. Tu so intervjuvanci opozorili tudi na »problem sodelovanja med tehničnimi in vsebinskimi deležniki«, čemur so posvetili premalo pozornosti, ker ni bilo dovolj jasnih opredelitev v metodoloških navodilih. Hkrati se je razvojni cikel neupravičeno podaljšal tudi pri upoštevanju manjših popravkov pri uvedbah, kar v tem primeru

pomeni »skrajšanje metodološkega cikla«. Pri nadaljnjem razvoju BIS pa je bil zaznan »problem pomanjkanja časa za izpopolnjevanje in nadgrajevanje ob vpeljavi, kar je predpisano v peti fazi metode ASAP«, kjer so se pojavile že zaznane težave zaradi premalo definirane prve faze uporabljene metode. Z upoštevanjem teh dejstev bi bila omogočena bolj sistematičen potek vseh faz življenjskega cikla metode kot tudi njihova pravočasna preverba, torej tudi boljši končni rezultat pri vpeljavi BIS glede na izkušnje iz preteklosti.

Med postavljenimi cilji na začetku procesa po metodologiji ASAP ni bilo v BIS zaznati upoštevanja donosnosti naložbe. To je v literaturi eden od poglobitnih delov metodologij razvoja poslovnointeligenčnih sistemov in pomeni posebnost BIS v primerjavi z IS. V projektu so si deležniki vseeno postavili cilj spremljanja učinkov, ki jih bo prinesla uvedba BIS. Zato predlagajo dodatno dopolnitev začetnih faz modela glede na morebitne nove težave, kar bi lahko dopolnilo obstoječe znanje in na novo ovrednotilo uporabljene metode.

Precejšen vpliv na uporabljeno metodo so zaznali v »prevelikih potrebah in željah uporabnikov BIS«, kar se lahko odraža v nedosledni uporabi predpisanega življenjskega cikla metodologije razvoja BIS. Zato predlagajo »natančno definiranje potreb, zahtev in pričakovanj v prvi fazi«, kjer je potrebno upoštevati tudi druge specifične vplive. Zaradi tega uporabljena metoda ASAP »ni povsem ustrezna«, ker ne upošteva specifičnih dejavnikov BIS, ki bolj natančno opredeljujejo vpeljavo sistema. Načrtovanje razvoja BIS mora biti v prihodnje po njihovem prepričanju »počasnejše in temeljitejše« ob upoštevanju zahtev uporabnikov, tako »tistih, ki metode uporabljajo pri razvoju BIS, kot tudi uporabnikov BIS«.

V razvoju metode poslovnointeligenčnih sistemov so intervjuvanci uporabljali metodo ASAP zaradi pravnih obveznosti do dobavitelja. Metodologija razvoja BIS je vsebovala življenjski cikel, podoben drugim sorodnim metodam, vpliv specifičnih lastnosti BIS in posebnosti javne uprave na sam razvoj pa je pričakovano velik. Uporaba izbrane metode razvoja je prinesla nekatere težave in probleme, zato ni bila sprejeta kot optimalna. Glede na ciljno usmerjenost metode ASAP točno določenim projektom, ki niso nujno povezani z BIS, ob tem pa se ne upošteva posebnosti javne uprave, je tovrstna problematika zaznavna in pomembna. Za izboljšanje uporabljene metode imajo intervjuvanci nekaj konkretnih predlogov (bolj podrobno definirane začetne zahteve in planiranje ter upoštevanje donosnosti naložbe, kot posebnosti BIS; prepoznavanje vplivov okolja in političnih dejavnikov, prenos znanja – kot posebnosti javne uprave). Te težave so prepoznali tudi uporabniki BIS. Če teh pripomb ne bi upoštevali, intervjuvanci predvidevajo sorodne težave tudi v prihodnjem razvoju poslovno inteligenčnih sistemov pri uporabi predpisanih metod. To pa potrjuje pravilnost domnev, postavljenih v raziskovalnem procesu našega prispevka.

Za analizo podatkov, ki smo jih pridobili v študiji, moramo narediti sintezo znanj o specifičnih lastnostih BIS, posebnostih javne uprave in primernosti



metode razvoja BIS iz gospodarstva v javni upravi. Ugotovitve ekspertov so potrdile, da obstajajo specifični dejavniki BIS in javne uprave, ki so navedeni v relevantni literaturi. Te je nujno potrebno upoštevati, v kolikor preučujemo BIS v kontekstu IS in razlike med gospodarstvom ter javno upravo. Hkrati so eksperti prepoznali neustreznost metod razvoja BIS iz gospodarstva, ki se uporabljajo v javni upravi. Na podlagi teh pridobljenih znanj lahko povežemo navedene posebnosti in uporabo metod razvoja BIS iz gospodarstva v javni upravi, pri čemer lahko ugotovimo, da so trditve ekspertov o neustreznosti uporabljene metodologije zaradi njene posplošenosti in posebnosti javne uprave pravilne. Z upoštevanjem predlogov iz naše študije primera lahko predpostavimo, da bi metodologija, ki bi upoštevala naše ugotovitve, omogočila uspešnejšo vpljavo BIS v javni upravi.

## **5 Diskusija in zaključki**

Za predstavljeni projekt razvoja BIS v organizaciji javne uprave smo v študiji primera pridobili ugotovitve, na podlagi katerih lahko ovrednotimo uporabljeno metodologijo ASAP. Pri tej metodi razvoja BIS so ob predlagani metodi, ki jo je priporočil zunanji razvijalec prenove IS, uporabljali v manjšem obsegu tudi splošno metodo EMRIS, kar pa po navedbah ekspertov ni bistveno vplivalo na metodološki proces. Ker smo med odgovori intervjuvancev zaznali potrditev specifik javne uprave in BIS, lahko sklepamo podobno kot v uvodu predstavljena literatura, ki potrjuje našo domnevo o neustreznosti uporabe splošnih metodologij razvoja iz gospodarstva v javni upravi. Zato bomo ponazorili specifične vplive, ki so posledica lastnosti javne uprave. V teh dejstvih so intervjuvanci pridobili osnovo za navedbe dejavnikov uspeha projektov v javni upravi, ki pomenijo končanje in dokončanje projektov »za vsako ceno«, kar se je v preučevanem primeru potrdilo v negativni oceni naknadne zunanje revizije (Računsko sodišče, 2014). Na ta način je viden znaten vpliv dejavnikov okolja, kar je ena od temeljnih predpostavk relevantne literature o posebnostih javne uprave in našega preučevanega primera. Dejavniki okolja pa imajo neposreden vpliv na javno upravo, pri čemer je potrebno upoštevati hipotezo o (ne)učinkovitosti organizacij javne uprave zaradi njihovih specifičnih lastnosti, ki obsegajo stroškovne dejavnike – odvisnosti od državnega proračuna in odsotnosti konkurence (Bartel & Harrison, 2005) ter birokratiziranosti javne uprave kot za okolje neželene lastnosti (Taskin & Edwards, 2007). Zato je potrebno za odzivanje na vpliv okoljskih dejavnikov v največji možni meri utemeljiti lastne ekspertne predloge in glede na morebitno posredovanje okoljskih akterjev preučiti njihov vpliv, s čimer lahko strokovno utemeljimo oziroma prilagodimo najboljše možne rešitve za uporabo metodologij razvoja BIS. Ob tem se je potrdilo, da zakonske omejitve kot ena od posebnosti javne uprave lahko prav tako negativno vplivajo na uspeh uporabe metodologij. Tudi druge posebnosti, kot so vpliv vodstvenega menedžmenta in politične situacije, so zaradi neupoštevanja v uporabljeni metodi postale v veliki meri odločujoč dejavnik uspeha.

Glede na literaturo tako obstaja utemeljen dvom o izboljšanju metodoloških postopkov pri vmešavanju vsakokratne politične situacije (Warne & Hart, 1996). Ob tem mora menedžment javne uprave upoštevati tudi ekonomsko komponento, pri čemer mora zaradi nenehnega varčevanja organizacij javne uprave dosledno zagotavljati zmanjševanje stroškov in racionalizacijo, kar lahko ob ponavljajočih se tovrstnih ciklih povzroča težave v delovanju organizacij (Waterman & McCue, 2012). Pri vplivih menedžmenta in političnih dejavnikov je potrebno podobno kot pri okoljskih dejavnikih po našem mnenju dosledno utemeljevati lastne predloge, poskušati zagotoviti relativno neodvisnost in glede na morebitno posredovanje teh dejavnikov preučiti njihov vpliv ter nato strokovno utemeljiti oziroma prilagoditi procese pri uporabi metodah razvoja BIS.

V tem kontekstu je potrebno opozoriti na triangulacijo oziroma medsebojno povezanost deležnikov, to je povezavo vplivov okolje-politična situacija-menedžment. Vpliv okolja se neposredno prepleta z vplivom politične situacije; le-ta ni in v določenih primerih ne sme biti imuna na okoljske vplive, ki jih v tem primeru sprožajo strokovna in laična javnost, interesne skupine, mediji in gospodarstvo. Politični dejavniki so odvisni tudi od neposrednih demokratičnih vzvodov, to je volitev, referendumov in drugih oblik demokratičnega odločanja; ti vzvodi so tudi glavno jedro dejavnikov, ki vplivajo iz okolja na politični dejavnik. Tu obstaja tudi možnost prevelikega in v določeni meri škodljivega vpliva interesnih skupin iz okolja na politično situacijo, zato je potrebno pri teh vplivih izbrati takšen strokovni pristop, ki bo osredotočen na dosledno strokovnost vseh zakonodajnih postopkov, tako da ne bodo dopuščali dvomov o izvedljivosti ne glede na morebitna posredovanja vseh zainteresiranih in vpletenih subjektov. Ker pa je zaradi državnega političnega sistema vpliv politike na menedžment javne uprave glede na praktične izkušnje znaten, je potrebno tudi v tem primeru zagotoviti najvišjo možno mero strokovnosti, ki bo o pravilnosti skušala prepričati menedžment ne glede na njegovo usmeritev, na katero lahko vpliva politična situacija ali zainteresirano okolje. Vpliv menedžmenta na okolje in politično situacijo je v tem primeru nekoliko manjši zaradi že navedenih ugotovitev in ne pomeni posebne in pomembne postavke triangulacije, ki bi jo bilo treba upoštevati. Njegov vpliv je mogoč samo v izrednih, nepredvidenih dogodkih, kjer bi menedžment organa v javni upravi s pomočjo učinkovitih odnosov z javnostjo lahko zagovarjal ekspertne rešitve. Na ta način bi na podlagi dokazane strokovnosti ob doslednem sledenju zakonskih predpisov prepričal druge vpletene deležnike o pravilnosti svojih usmeritev in tako uveljavil svoj vpliv. Ob uporabi teh pristopov bi bila možnost za morebitno negativno vplivanje opisanih specifičnih dejavnikov pri uporabi metodologij razvoja v javni upravi po našem prepričanju znatno zmanjšana.

V literaturi zasledimo večfazni proces vpeljave BIS na področju javne uprave z uporabo uravnoteženih kazalnikov (Niehaves & Müller-Wienbergen, 2007). Ugotovljena kazalnika definiranja strateške organizacijske vizije v povezavi

z vplivom vpletenih deležnikov sta bila prepoznana kot značilna za specifično področje javne uprave. V tem primeru lahko ugotovimo, da ta pristop zagotavlja učinkovito vpeljavo BIS v javni upravi, potrjen pa je v prikazani študiji primera raziskovalcev Niehavesa in Müller-Wienbergena. Testiranje teh izsledkov s predstavljenimi v naši raziskavi nakazuje trditev, da morajo biti specifični dejavniki vsebovani v metodi razvoja BIS pri uspešni uvedbi na področju javne uprave, opozarjamo pa predvsem na enake ugotovitve obeh raziskav glede vpliva deležnikov pri vpeljavi BIS v javno upravo. Ob temu pa je naša raziskava dodatno pokazala, da obstaja več vrst teh specifičnih dejavnikov, ki jih je potrebno upoštevati. Hkrati smo dokazali tudi njihovo medsebojno povezanost, zato predlagamo upoštevanje izsledkov naše raziskave pri nadaljnjih raziskavah na tem področju.

Ker je uporabljena metoda namenjena razvoju IS, so se pokazale nekatere posebnosti pri razvoju BIS, na kar so opozorili tudi eksperti. Čeprav je metoda ASAP po njihovih zagotovilih splošna in sorodna drugim metodam, pa so zaznali težave pri vpeljavi in posledično učinkovitosti sistema, kjer ni bilo v zadostni meri opredeljeno začetno definiranje ciljev in potreb, zaradi česar so morali po svojih zmožnostih in ugotovitvah prilagajati vpeljavo BIS pri deležnikih. Na to problematiko je opozorila tudi študija (Popovič et al., 2012), ki je pokazala specifično lastnost BIS in zaznala razlike med karakteristikami obeh sistemov v post-tehnološki fazi uvajanja. V tem primeru ugotavljamo, da je potrebno posvetiti večjo pozornost pri začetnih fazah življenjskega cikla metode, kjer je predpisan celoten potek in plan razvoja BIS. Uporabljena metoda po našem prepričanju tudi ni zadostila specifičnim zahtevam BIS, kjer se identificirajo potrebe na podlagi upravljanja in učinkovitosti delovanja (Grublješič, 2014). Zaradi teh zahtev BIS uporabljena metoda po našem prepričanju ni v zadostnem obsegu sledila donosnosti naložbe, ki je ena od pglavitnih metodoloških predpostavk (Williams & Williams, 2007). Tudi v tem primeru moramo izpostaviti pomanjkljivost uporabljene metode zaradi specifičnih razlik BIS, kar pa pripisujemo splošnosti metode ASAP. Zato predlagamo v nadaljnjem razvoju in uporabi teh metod za razvoj BIS aktivnosti za prilagoditev življenjskega cikla, kjer bi v začetni fazi sledili k bolj podrobno postavljenim ciljem in planom ter čim večji donosnosti naložbe v BIS, ob tem pa bi bil po našem mnenju uspeh projektov razvoja BIS nedvomno večji. Zaradi pomanjkljivosti celotnega projekta so intervjuvanci morali prilagajati uporabljeno metodologijo, ocenili pa so, da bi bilo ob takšnih začetnih predpostavkah malo verjetno uporabiti uspešno katerokoli metodo pri razvoju BIS.

Projektna dokumentacija razvoja BIS se je glede na pridobljena znanja iz intervjuja in arhivskih zapiskov ekspertov pokazala kot nekoliko pomanjkljiva, ker ni dovolj dobro opredelila zahteve za opredelitev ciljev projekta, ni v zadostnem obsegu predvidela težav pri tehničnih zahtevah zaradi izbire zunanjega izvajalca in ni opredelila časovnih ter stroškovnih zahtev, kar je ugotovila naknadna revizija. Tudi to problematiko smo zaznali v okviru

specifičnih dejavnikov BIS pri procesu uvajanja v uporabo. Za to smo dobili potrditev v literaturi (Popovič et al., 2012), kjer so izpostavljene posebnosti BIS v fazi začetne uporabe sistema; na ta način priporočamo tudi že predstavljene aktivnosti za zmanjšanje vpliva teh specifičnih dejavnikov BIS. Čeprav je vzpostavitev BIS dokončana, pa je neuspeh celotnega projekta glede na vse ugotovitve v veliki meri nedvomno potrjen, njegov končni rezultat pa zaradi nepredvidljivih okoliščin negotov. Zato lahko na osnovi zgoraj navedenih dejstev sklepamo, da uporabljena metoda ASAP ni najbolj primerna za razvoj BIS v javni upravi, kar daje relevantno težo našim teoretičnim ugotovitvam o neprimernosti uporabe splošnih metod razvoja, razvitih za gospodarstvo v javni upravi. Neustreznost uporabljenih metod se kaže v neupoštevanju specifičnih lastnosti javne uprave in BIS, ki obstajajo v primerjavi z gospodarstvom in IS.

Po analizi opravljenih intervjujev in pregleda dokumentacije lahko naredimo sintezo ugotovljenih dejstev. Naše glavne ugotovitve so naslednje:

- V študiji primera so bile prepoznane posebnosti in razlike javne uprave in gospodarstva, zato moramo to dejstvo upoštevati pri vpeljavi metodi razvoja BIS.
- V študiji primera so prepoznane tudi posebnosti BIS v primerjavi z IS.
- Uporabljena metoda razvoja BIS, ki so jo uporabljali eksperti v okviru javne uprave, se ni izkazala kot optimalna; razloge vidijo predvsem v namembnosti metode za gospodarstvo in razvoj IS, kar je potrdila tudi relevantna literatura.
- Spoznanja iz obstoječe literature o upoštevanju specifičnih dejavnikov javne uprave pri razvoju BIS smo dopolnili z dodatnimi dejavniki.
- Zaradi neprilagojenosti uporabljene metode razvoja BIS v javni upravi so se pojavile težave pri uvajanju BIS.
- V študiji primera smo ugotovili, da je potrebna dopolnitev in prilagoditev obstoječe metodologije razvoja BIS glede na posebnosti javne uprave in BIS, ki obstajajo v primerjavi z gospodarstvom in IS: upoštevati je potrebno vpliv politične situacije in okolja ter posredno vodstvenega menedžmenta, hkrati pa pri vpeljavi BIS vzpostaviti aktivnosti za natančnejše definiranje zahtev in ciljev ter upoštevanje večje donosnosti naložbe.

## 6 Sklep

Na osnovi navedenih dejstev ugotavljamo, da je študija primera zadostila postavljenemu cilju raziskave, na podlagi katerega smo ovrednotili uporabo splošne metode za razvoj BIS iz gospodarstva v javni upravi. Glede na predstavljene ugotovitve so bile naše teoretične predpostavke pravilne: uporabljena metodologija razvoja BIS ni povsem ustrezna za uporabo v javni upravi. Naš prispevek je dokazal, da obstajajo specifične razlike med gospodarstvom in javno upravo ter specifične lastnosti BIS v primerjavi z IS,

ki vse vplivajo na uporabo obstoječih metod razvoja BIS. Na ta način smo dopolnili tudi obstoječa spoznanja iz literature, opazen je tudi naš prispevek k preučevanemu področju. Zato smo v zaključkih raziskave podali predloge glede na izsledke opravljene študije primera, na osnovi katerega bo mogoče v nadaljnjem raziskovanju dopolniti znanja na metodološkem področju razvoja BIS in na ta način izpopolniti ter prilagoditi omenjene metode za uspešnejšo uporabo v javni upravi. Tako je naš prispevek lahko osnova za nadaljnje raziskovanje te problematike.

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# Development of Business Intelligence Systems in Slovenian Public Administration – A Case Study

## ABSTRACT

Business Intelligence Systems (BIS) have become an important factor in successful business operations. In literature there are many methodological approaches to their implementation, but they have been mainly applied in the private sector. Due to all the advantages of BIS, their implementation in the public administration would be reasonable as well, however, limited experience and scientific research are available in this area. This paper deals with the applicability of the methodologies of BIS development in public administration. Focusing on the specific characteristics of the public administration, we have studied a case in one of the governmental organizations, where a general method of BIS development was used, which was originally developed for the private sector. As a research method a case study was used, on the basis of which the implemented method of BIS development was evaluated and the groundwork for future research in the field of public administration defined. By means of this research we have found that the implemented methods of BIS development, which were developed for the private sector information systems, do not consider the specific characteristics and differences of the public administration and the BIS systems. Therefore, considering their specific features, they should be properly completed and adapted.

*Keywords: business intelligence systems (BIS), public administration, methodology of business intelligence system development, case study*

*JEL: H83, M15*

## 1 Introduction

Business Intelligence Systems (BIS) have become an important factor in business operations of organizational systems in modern society, their basic purpose being the analysis and research of business operations (Elbashir, Collier, Sutton, Davern, & Leech, 2013). BIS represent an information system (IS) providing quality information contained in well organized data stores and enabling the analytic users efficient analyses and intuitive presentations of data which subsequently serve as the groundwork of implementing appropriate activities or decisions (Popovič, Hackney, Coelho, & Jaklič, 2012). Organizations decide to implement BIS when their information process has to be improved or another method of providing information is needed.

The basic purpose of the implementation of BIS is to improve the quality of information, which can be achieved by means of a better access to relevant data, combination of data from different sources and an interactive access to these data (Popovič, Turk, & Jaklič, 2010). Initially, BIS were introduced in the private sector as a rule, therefore several methodological approaches to the development of BIS were employed (Williams & Williams, 2007; Moss & Atre, 2003), which were – at least implicitly – designed for development in the private sector organizations. Within the public administration organizations, the research in this field has been limited, nevertheless, the interest in development and implementation of BIS has been growing there as well (Gadda & Dey, 2014; Boselli, Cesarini, & Mezzanzanica, 2011), regardless of possible differences and specific features. On the basis of these premises, the applicability of the use of BIS development methods, which were developed for the private sector, to the public administration will be researched in this article, considering specific features and differences existing between both areas.

The purpose of the article is the evaluation of the methodology of business intelligence systems development in the public administration, considering the fact that the method was initially designed for the private sector organizations. Therefore, a case of implementation of BIS development in a public administration agency within a thorough modernization of the entire IS was studied. Additionally, specific features of BIS with regard to IS which can be found in the references, will be considered. The objective of the article is an objective assessment of the case of implementation of BIS development by studying the findings of the experts who participated in the development, and suggesting improvements on basis of the results of the conducted research. Additionally, other theoretical approach in the field of study of BIS in the public administration will be examined. As one of the qualitative research approaches, which is the most appropriate for such a research within evaluation studies of information technologies introduction, the case study will be used (Kaplan & Maxwell, 2005). The results of the research represent a new insight into the methodologies of the business intelligence systems development in the public administration.

In the article, theoretical groundwork in the area of methodologies of BIS development are introduced, followed by the determination of research methods and the process of the case study. In the central part the results of the study are presented and the researched methodology is evaluated; the article is concluded by a discussion and the principal findings of the research. Thus, the article establishes that in the public administration specific features and differences should be considered when using the existing general and purposive methods of BIS development, designed for the private sector; they have to be appropriately adapted and amended.

## **2 Theoretical Groundwork**

In the literature, methodologies of the information systems development in public administration have been determined (Ishak & Alias, 2005; Goldkuhl & Röstlinger, 2010; Haklay, 2002), representing a general approach to the development of IS. In this context, the methods have been determined by a stipulated life cycle (Aydin, Harmsen, van Slooten, & Stegwee, 2004; Qumer & Henderson-Sellers, 2008; Brinkkemper, 1996); nevertheless, similar declarations can be also found in the references within a more specific realm of BIS (Moss & Atre, 2003; Williams & Williams, 2007). We hereby draw attention to the possibility that the general methods of IS development are not completely suitable for the BIS development in the public administration, although such approach can also be found (Hartley & Seymour, 2011). With BIS, the economic component of the investment payback is especially emphasized as the principal factor (Williams & Williams, 2007), therefore we recommend the implementation of dedicated methodology at implementing BIS into public administration. Some studies determine the specifics of BIS as regards IS (Popovič et al., 2012), mainly emphasizing the differences in the implementation of systems following the technological stage. The other references mention various end-users of BIS, recognize different collection of necessary data, inquiry and acquisition from external sources; they define various levels of reliability and correctness of the acquired data and determine different procedures for the implementation of the systems (Grublješič, 2014).

The methodology of BIS development (Moss & Atre, methodology *BI Roadmap*, 2003; Williams & Williams, *BI Pathway*, 2007) is represented as a complex system, therefore its development and implementation are complex as well. It is described as a multi-stage development cycle with the possibility of cyclic repetition, whereby the key success factors have to be followed, an adequate technological solution selected, data bases adjusted, end-users tested and trained, and the set objectives targeted (Gangadharan & Swami, 2004). Due to the findings in the references (Decision path consulting, 2008) it can be supposed in the context of our case study that the existing methods of BIS development have been mainly designed for the implementation in the private sector, therefore it is questionable whether these methodologies are appropriate to be implemented in the field of the public administration. The latter represents an organizational field which is somewhat different from the private sector (Rainey & Bozeman, 2000; Rocheleau & Wu, 2002; Nutt, 2005; Bannister, 2001; Bretschneider, 1990; Ariyachandra & Frolick, 2008; Ward & Mitchell, 2004). The main differences and specific factors are the impacts of politics and external environment; nevertheless, the impact of the executive management on the successful implementation of the existing methods of BIS development in the public administration must also be considered.

Considering those factors our research will be compared to the BIS development in the public administration, where the multiple-stage introduction of BIS approach with the implementation of balanced scorecard has been described (Niehaves & Müller-Wienbergen, 2007). They are represented by definition of stakeholders and determination of a clear organization's vision, by definition of measurable objectives and actions and establishment of controlling to ensure the efficiency of BIS. These facts will enable a comparison with our findings relating to BIS; at the same time, we will also be able to additionally evaluate the theoretical premises in the references while setting a relevant groundwork for further research of BIS development in the public administration.

### **3 Research Methods**

A case study as a method is a way of research of an empirical problem with a suitable selection of required procedures; it is comprehended as a soft research method due to the possibility of deviation from following the set procedures. In the case study the researcher is faced with the definition of the study itself, with acquisition of relevant data and with the processing of the acquired data (Yin, 2003). A case study as a research method in the area of IS implementation is characterized as an in-depth study of an artefact in a business environment (Hevner, March, Park, & Ram, 2004), reaffirming the suitability of its implementation in the research. A case study as an approach in the research of BIS in public administration has also been mentioned in other references (Gadda & Dey, 2014). Our case study will follow the multi-stage method in the references (Yin, 2003), whereby we will study the case of implementation of IS development method used for development of BIS in public administration.

In consideration of the theoretical groundwork, we have assessed the implemented methodology of BIS development in the public administration within the case study. The findings of the experts were analysed with regard to the preceding data collection, whereby attention was paid to the assertions evaluating the implemented methodology in view of the specific features of the public administration and simultaneously the specifics of BIS.

In the case study, data was collected mainly by means of interviews, representing the principal source of data for further processing. In the realm of the investigation of BIS in the public administration, the data acquisition is conducted mainly by means of interviewing the participants and experts who took part in these projects (Sapp, Mazzuchi, & Sarkani, 2014). At the same time, we also examined the project and expert documentation on business, technical and general requirements for establishing an integral information system of an organization in the public administration (DURS, 2014), which was collected during the process of BIS development, and we studied the records on the observations of some other users participating in the formation of BIS,

on the basis of which we obtained some missing information. With analytical procedures the given expert statements were studied for each individual answer, subsequently, the answer analysis was comparatively less demanding as the questions were oriented and subject-related. Having completed the interviews and examined the documentation and records, we evaluated and filtered the collected information appropriately, so that they became suitable for further implementation and the completion of the case study. The data was analyzed with regard to the nature of the public administration and the specifics of BIS, so that the expert statements were linked with the established specific factors from relevant references. Subsequently, we also examined the links between the unsuitable features of the implemented method and the expert findings concerning the problems of the method of BIS development in the public administration. By linking the relations between both analyses a suitable quantity of knowledge to form recommendations for further research of this set of issues was achieved.

The study was conducted in an organization of the public administration (then the Tax Administration of the Republic of Slovenia, now Financial Administration RS), which decided to carry out a thorough modernization of the information system. Due to the existing partial solutions of predominantly outdated systems, after thorough discussion and public bids an external tenderer was chosen, whereby it was assumed that the modernization would be carried out in several stages and that it will last for a considerable period of time. As part of the offered software SAP a module of a business intelligence system was also presented and its features explained to the public organization, which subsequently decided to implement this module. The modernization process of the information system in a public administration organization, within which the business intelligence system was established and was conducted in the period from 2010 to 2012. The project of the IS modernization in the organization was carried out according to the methodology ASAP (Ascendant SAP) which – being a general development methodology of information systems for large organizations – is based on the software SAP, but also contains possibilities for designing and implementation of business intelligence systems (Deng & Chi, 2013).

Data collection with interviews and examination of documentation and records was carried out during the years 2013 and 2014. The organization has several thousands of employees; at the time of the research the department of information technology where the interviews were conducted, consisted of approximately 90 employees. Three structured interviews were conducted with experts in the field of business intelligence systems, who were managing all significant processes within the implementation of the method of BIS development; due to some personnel limitations these three experts were the only participants in the processes. The interviews were conducted at the workplace of the interviewees, with the participants' consent the entire procedure was recorded on electronic media, for the purpose of subsequent

integral processing of the results. If necessary, a subsequent transcript of the recording would be made in the future in paper form for the purpose of eventual check of the interviewees as to the correctness of their statements. The interviewing process was supervised by one investigator, whereby the first interview was conducted with the manager of BIS development, the remaining two interviews were carried out with professional associates at the implementation of the method of BIS development with the objective of verifying the results, obtained in the first interview.

The anticipated duration of an interview had been determined in view of the duration of efficient co-operation of all participants, according to our estimate from one hour and a half to two hours. The examined project documentation contained business requirements, technical requirements and general requirements (DURS, 2014).

By means of interviews, we wanted to obtain information on the implemented method of BIS development and on its life cycle, on the experts' approach to the implementation of individual stages and on the problems which appeared at the introduction of BIS. Consideration of expert opinions along with an accurate definition of requirements, on the basis of which the entire life cycle can be defined, is the key success factor in projects of this kind (Coffey, 2012). Furthermore, as the method of BIS development from the private sector was used, we were interested in the consideration of specific differences between the public administration and the private sector, or the eventual impact of the specifics at the implementation of this method. At the same time, we also examined the specifics of BIS in the context of IS as regards the generality of the implemented method. On the basis of expert experience the further research procedure was designed, whereby we received suggestions for improvements in the further implementation of the method of BIS development; moreover, suggestions for the development of such methods in the future can be made as well. By summarizing the obtained knowledge the method of BIS development in the public administration can be evaluated and the existing specifics and differences between the private sector and the public administration confirmed or rejected, thus enabling a more successful methodological development of BIS in the public administration in the future. The examination of the expert documentation and the records provides an insight into the theoretical groundwork of the entire BIS development and the examination of the experts' empirical experience with the implementation of the methodology; the principal knowledge was obtained predominantly from the interviews. The topics of questions in the interview are listed in Table 1.

**Table 1: The content of observation data collection by means of interviews**

1. The implemented methodological approach with the method of BIS development
2. Life cycle of the method of BIS development
3. Consideration of specific differences between the public administration and the private sector regarding the method of BIS development
4. Difficulties regarding the implemented methods of BIS development
5. Improvement suggestions and planned activities as to the future methods of BIS development
6. Recommendations for further research of the method of BIS development
7. Evaluation of the implemented method of BIS development

## **4 The Results of the Study**

In the conducted case study the interviewees participating in the project of IS modernisation and BIS establishment used the ASAP method, suggested by the supplier of the hardware and software in the modernization of the entire information system. Methodologically, BIS was developed in five stages, including the “project preparation, business procedures plan, realization, conclusive preparations and implementation with maintenance, all of which represents a comparable sequence to the life cycles of other comparable methods”.

The experts’ reply to the question about the consideration of specific features and differences between the public administration and the private sector was that they influenced the process to such an extent that “they still cause trouble, primarily due to the legal rigorosity of the public administration”. The key success factors with the methodology of BIS development are connected with the problems of the public administration, which is also evident from the experts’ records. The interviewees do not consider the methodology ASAP, which was basically intended for the methodological IS development in the private sector, completely suitable for the requirements of the public administration. The principal problem the interviewees have identified regarding the implemented method ASAP is the undefined risk consideration due to external factors, which in the realm of the public administration mostly appear as specifics in the form of political factors. In this context the experts drew attention to the specific differences from the private sector where ASAP was primarily developed; thus we received a confirmation of the statements from relevant references on specific factors of the public administration. The interviewees also stated that a shortcoming of the ASAP method was the “disregard of knowledge transfer”, which caused an outflow of personnel during the process of BI development; according to their statements, this fact is the consequence of the specifics of the public administration as well.

To improve the implemented method of BIS development along with the consideration of the specifics of the public administration, the interviewees proposed completing the first stage of the life cycle with the “consideration

of environmental and political factors with a consistent consideration of the problem identification and a precise definition of objectives and knowledge transfer", which is not defined precisely enough within the implemented method, due to the specific features of the public administration influencing the methodology process. According to their opinion, the ASAP method does not sufficiently consider the flexibility during the development itself, which can be partly corrected by means of cyclic repetition. However, due to the specific features of the public administration this part of methodology is "poorly feasible owing to legislative procedures", although the time frame would not represent strict limitations. The implemented method does not anticipate special attention "to the organizational environment", which can at initial stages represent a certain level of uncertainty in the frame of requirement definition and planning. Therefore, the interviewees as well as the participating users expect certain improvements of the implemented methodology. During the first stage, beside the project preparation, special attention must be paid to the actual requirements of the organization, where the methodological BIS development is in progress. Methodologists are also not supposed to neglect the impact of the "internal (organizational) and external (environment) changes" throughout the life cycle, which is a recognized specific of the public administration.

On the basis of these findings, the interviewees cannot rule out the already identified problems like the "completion of a project at any cost" when planning the activities of the methodological development in the future, as well as other listed environmental impacts, which are the consequences of features of the public administration field. However, they do emphasize that in the private sector these problems are not outstanding to the extent that they could influence the life cycle structure of the methodology development of business intelligence systems. In this case the rest of the users perceived the effect of the "completion at any cost" as well. BIS does not enable all potential advantages, presented at the beginning of the project; also, some problems appear in the system operation that influence the efficiency of the implementation of BIS considerably.

Within the following set of answers we can obtain confirmation of the specific features of BIS, presented in the theoretical groundwork, arising from the implementation of the general method of IS ASAP development. With the implemented method of BIS development problems were observed also due to the inadequate definition of the life cycle, leading to the insufficiently segmented initial stages of the objectives definition. This leads to "the lack of communication between external developers and users, in this case predominantly due to the insufficient definition of the distinctive requirements of the project" as well as the "overhasty demand to reach the objectives", owing to which the "method becomes less viable" as was noticed regarding the trouble with the introduction of BIS. The interviewees also pointed out the "problem of cooperation between technical and contentual



participants”; not enough attention was paid to this matter as there were no clear enough definitions in the methodological instructions. At the same time the development cycle was unduly prolonged even in cases when minor corrections were made during introductions, which in this case represents the “shortening of the methodological cycle”. During the further BIS development the “problem of time shortage for improving the quality during introduction, which was stipulated in the fifth stage of the ASAP method”, where the previously perceived problems appeared due to the inadequately defined first stage of the implemented method. Considering these facts, a more systematic progression of all stages of the life cycle of the method would be made possible as well as a timely testing of the stages, leading to a better final result of the BIS introduction with regards to the past experience.

Among the set objectives at the beginning of the process according to the ASAP methodology there were no tendencies towards the return on investment into BIS. Which is according to the references one of the principal parts of methodologies of business intelligence systems development and represents specifics of BIS in comparison with IS. Nevertheless, the stakeholders in the project set the objective of examining the impacts caused by the introduction of BIS. That is why they suggest an addition to the initial stages of the model in view of the eventual new problems, so that the existing knowledge can be completed and the implemented methods evaluated anew.

The implemented method was substantially influenced by “oversized requirements and wishes of the BIS users”, which can reflect in an inconsistent implementation of the stipulated life cycle of the methodology of BIS development. Therefore they suggest a “precise definition of needs, requirements and expectations during the first stage”, whereby the rest of the specific impacts have to be considered as well. Thus, the implemented ASAP method “is not completely adequate” as it does not consider the specific features of BIS, which define the introduction of the system more precisely. They believe that in the future the planning of BIS development should be “slower and more thorough” and consider the requirements of the users, the ones that “implement the methods in BIS development as well as the users of BIS itself”.

Within the development of the method of business intelligence systems the interviewees implemented the ASAP method due to the legal obligations towards the supplier. The methodology of BIS development contained a life cycle similar to other related methods, the impact of the specific features of BIS and the specifics of the public administration on the development itself was considerable, as was expected. The implementation of the chosen method of development caused some difficulties and problems, thus it was not accepted as being optimal. Regarding the fact that the ASAP method is objective-oriented towards specific projects which are not necessarily linked with BIS, whereby the specifics of the public administration are not considered, this kind of problems are noticeable and important. The interviewees have

some concrete suggestions how to improve the implemented method (more specifically defined initial requirements and planning, stronger tendency towards the return of the investment – specifics of BIS, recognition of environmental impacts and impacts of political factors, knowledge transfer – specifics of the public administration). These problems have been also perceived by end-users of BIS. In case these remarks are not taken into consideration, they anticipate similar difficulties in the future development of business intelligence systems with implementation of the stipulated methods as well. This, however, confirms the correctness of the hypotheses set during the research process of our article.

To analyze the data obtained in the study, a synthesis of knowledge about the specific features of BIS, the specifics of the public administration and the adequacy of the method of BIS development from the private sector for implementation in public administration has to be made. The experts' findings have confirmed that the specific factors of BIS and public administration listed in the relevant references, really exist. Which must be considered when researching BIS in the context of IS as well as the differences between the private sector and the public administration. At the same time, the experts ascertained that the methods of BIS development from the private sector are inadequate for implementation in the public administration. On the basis of obtained knowledge we can relate the above mentioned specifics to the implementation of the methods of BIS development from the private sector in the public administration, whereby it can be established that the experts' statements about the inadequacy of the implemented methodology due to its general nature and the specifics of the public administration are correct. Considering the suggestions in our case study, it can be assumed that the methodology which would take our findings into consideration, would enable a more successful introduction of BIS into the public administration.

## **5 Discussion and Conclusions**

In the case study, findings were obtained for the presented project of BIS development in the organization of the public administration, on the basis of which the implemented ASAP methodology can be evaluated. Beside this method, suggested by the external developer of the IS modernization, the general EMRIS method was also used to a limited extent; according to the experts' statements this did not influence the methodological process materially. As we have obtained the confirmation of the specifics of the public administration and BIS in the interviewees' answers, we can draw conclusions which are similar to the ones in the references presented in the introduction, confirming our hypothesis about the inadequacy of the implementation of general development methodologies from the private sector in the public administration. Therefore, specific impacts, consequences of the features of the public administration will be explained. Thus, the interviewees obtained a basis for listing the success factors of projects in public administration,

representing the termination and completion of projects “at any cost”, which was in the researched case confirmed by the negative evaluation of the subsequent external audit (Računsko sodišče – Court of Audits, 2014). In this way a substantial impact of the environmental factors is noticeable, this being one of the basic hypotheses of the relevant references on the specifics of the public administration and the case we researched. The environmental factors, however, directly influence the public administration, whereby the hypothesis about the (in)efficiency of the public administration organizations due to their specific features has to be considered; they contain cost factors – dependency on the national budget and the absence of competition (Bartel & Harrison, 2005) as well as the bureaucratization of the public administration as an unwanted characteristic in relation to the environment (Taskin & Edwards, 2007). To react to the impact of environmental factors, authentic expert suggestions have to be substantiated to the largest possible extent and in view of eventual intervention of environmental agents their influence must be studied in order to be able to competently substantiate or adapt the best possible solutions for the implementation of methodologies for BIS development. It has been confirmed that legal limitations as one of the specifics of the public administration can influence the success of the implementation of methodologies negatively as well. Also the other specifics like the impact of the executive management and the political situation became to a great extent a decisive success factor as they were not considered within the implemented method. According to the references, a reasonable doubt about the improvement of methodological procedures exists if the current political situation is involved (Warne & Hart, 1996). The management of the public administration must also consider the economic component as it is compelled – due to constant economizing in the public administration organizations – to ensure reduction of costs and rationalization constantly, which can in iteration cause trouble in the operation of the organizations (Waterman & McCue, 2012). With impacts of the management and political factors, just like with environmental factors, we believe that authentic suggestions have to be substantiated consistently, an attempt at ensuring relative independence must be made and according to eventual intervention on the part of these factors their influence must be studied and then the processes in the implementation of the methods of BIS development competently substantiated or adapted.

In this context the triangulation or the mutual connectedness of the participants, represented by the relation of impacts – political situation – management, has to be pointed out. The impact of the environment is directly interwoven with the impact of the political situation; the latter is not and in certain cases should not be immune to environmental impacts which are in this case represented by the professional and lay public, interest groups, media and the private sector. Political factors also depend on direct democratic levers, represented by the elections, referendums and other forms of democratic decision-making; these levers represent the main core

of the factors which exert influence from the environment on a political factor. A possibility of a too large and to a certain extent harmful impact of interest groups from the environment on the political situation also exists, therefore an expert approach should be chosen with the impacts, which will be oriented towards consistent expertise of all legislative procedures, so that there can be no doubt about the feasibility regardless of eventual interventions of interested and involved agents. Due to the national political system the impact of politics on the management of the public administration is substantial, considering practical experience, therefore, also in this case the highest possible level of expertise has to be ensured; it will attempt to persuade the management regardless of its orientation, which can be influenced by the political situation or the interested environment. The impact of the management on the environment and the political situation is in this case somewhat weaker due to the above stated findings and does not represent a special and important item of triangulation that would have to be considered. Its impact is only possible at exceptional, unforeseen events where the management of an organization within the public administration could advocate expert solutions by means of efficient public relations. Thus, it would on the basis of proven expertise and consistently abiding by the legal regulations persuade other involved participants about the correctness of its orientation and in this way enforce its influence. We believe that by using these approaches, the possibility of eventual negative impacts of the above stated specific factors at the implementation of the development methodologies in the public administration is considerably reduced.

In the references a multi-stage procedure of the introduction of BIS in the field of public administration by the implementation of balanced scorecard can be found (Niehaves & Müller-Wienbergen, 2007). The established scorecard of defining a strategical vision of the organization in connection with the impact of the participants involved was determined as characteristic for the specific field of the public administration. In this case it can be established that this approach ensures an efficient introduction of BIS into the public administration; it was confirmed in the presented case study by the researchers Niehaves and Müller-Wienbergen. Testing these findings with the ones presented in our research results in a statement that specific factors must be a constituent part of the method of BIS development to ensure its successful introduction to the field of public administration; however, we are drawing attention to equal findings of both investigations regarding the participants' impact at the introduction of BIS to public administration. Additionally, our research exposed the existence of several kinds of such specific factors, which have to be taken into consideration. We also proved their mutual connection, therefore we suggest that the findings of our research should be considered at further research in this field.

As the implemented method is intended for the IS development, some specifics at BIS development came up, which was also pointed out by the

experts. Although the ASAP method is according to their assurances general and related to the others, problems were perceived as regards the introduction and consequently the efficiency of the system, where the initial definition of objectives and requirements was inadequate; that is why they had to adapt the introduction of BIS according to their own abilities and findings. The study (Popovič et al., 2012) also pointed out this set of issues, showing the specific feature of BIS and perceiving the differences between both systems during the post-technological stage of introduction. In this case we ascertain that more attention has to be paid to the initial stages of the life cycle of the method, where the entire process and the plan of the BIS development is stipulated. We also believe that the implemented method did not fulfill the specific requirements of BIS, where the needs were identified on the basis of management and efficiency of operation (Grublješič, 2014). In our opinion, due to these requirements of BIS the implemented method did not adequately aim at the return of investment, this being one of the essential methodological hypotheses (Williams & Williams, 2007). In this case the deficiency of the implemented method due to the specific differences of BIS also has to be exposed, this being attributed to the generality of the ASAP method. Therefore, we suggest that in further development and implementation of these methods of BIS development activities to adapt the life cycle should be carried out, so that in the initial stage the set objectives and plans would be more detailed and the highest possible return on investment into BIS would be aimed at. Thus, we believe that the BIS development projects could undoubtedly be more successful. Owing to the deficiencies of the entire project the implemented methodology had to be adapted, however, it was estimated that with such initial hypotheses any method of BIS development would hardly be successful.

Considering the acquired knowledge from the interviews and the experts' records, the project documentation of BIS development proved to be slightly deficient, as the requirements to define the project's objectives were insufficiently defined, problems with technical requirements owing to the selection of an external developer were not anticipated to an adequate extent and the requirements as to the time and costs were not defined, as was later established by the audit. These problems were also perceived in the frame of specific factors of BIS during the process of introduction. This was confirmed by the references (Popovič et al., 2012), where the specifics of BIS in the stage of the initial implementation of the system itself were pointed out; in this way we also recommend the previously presented activities to reduce the impact of the specific BIS factors. Although the installation of BIS has been completed, considering all findings, the failure of the entire project to a considerable extent has undoubtedly been proved, and its end result is uncertain due to unforeseeable circumstances. Thus, we can conclude on the basis of the above stated facts that the implemented ASAP method is not the most suitable one for the BIS development in the public administration, this being a relevant confirmation of our theoretical findings that general methods

of development, designed for the private sector, are inappropriate for the BIS development in the public administration. The implemented methods are unsuitable because the specific features of the public administration and BIS in comparison with the private sector and IS are not taken into consideration.

Upon the analysis of the conducted interviews and the examination of the documentation a synthesis of the established facts can be made. Our main findings are as follows:

- In the case study, the specifics and the differences between the public administration and the private sector were established, therefore this fact must be considered at the introduction of the method of BIS development.
- In the case study also specifics of BIS in comparison with IS were established.
- The implemented method of BIS development, employed by the experts within the public administration, did not prove to be optimal; they see the reasons mainly in the fact that the method was designed for the private sector and the IS development, which was also confirmed by relevant references.
- We completed the findings in the existing references on consideration of specific factors of the public administration at BIS development with additional factors.
- As the methods of BIS development were not adapted to the public administration, problems appeared during the introduction of BIS.
- In the case study we have established that a completion and adaptation of the existing method of BIS development is necessary due to the specifics of the public administration and BIS in comparison with the private sector and IS: the impacts of the political situation and the environment and indirectly the executive management have to be considered and the activities to define the requirements and objectives and to pursue a higher return of investment initiated.

## **6 Conclusion**

On the basis of the facts stated above we find that the case study has fulfilled the set objectives of the research, which was to evaluate the implementation of the general method of BIS development designed for the private sector, in the public administration. As to the presented findings our theoretical hypotheses were correct: the implemented method of BIS development is not completely functional in the public administration. Our research has proved that there are specific differences between the private sector and the public administration and specific features of BIS in comparison with IS, all of them influencing the implementation of the existing methods of BIS development. In this way we have also completed the existing findings from references,

and also our contribution to the area of research is perceptible. Therefore, in the conclusion of the research, we made suggestions considering the results of the conducted case study, on the basis of which knowledge of the methodological realm of the BIS development can be supplemented with further research, thus improving and adapting the above mentioned methods for a more successful implementation in public administration. Thus, our article can serve as a basis for further research on these issues.

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