

Факултет Фармацеутски

УНИВЕРЗИТЕТ У БЕОГРАДУ

01 број 2256/1-1
(Број захтева)Већу научних области медицинских наука
(Назив већа научне области коме се захтев упућује)10.09.2026.
(Датум)**ЗАХТЕВ**

за давање сагласности на одлуке о усвајању извештаја Комисије за оцену докторске дисертације и о именовању комисије за одбрану

Молимо да, сходно члану 47. ст. 5. тач. 4. Статута Универзитета у Београду ("Гласник Универзитета", број 186/15-пречишћени текст и 189/16), дате сагласност на одлуку о усвајању извештаја Комисије за оцену докторске дисертације:

КАНДИДАТ ЈОВАНА (ЗОРАН) МИЛЕНКОВИЋ
(име, име једног од родитеља и презиме)

студент докторских студија на студијском програму ДОКТОРСКЕ АКАДЕМСКЕ СТУДИЈЕ, ФАРМАЦЕУТСКЕ НАУКЕ, СОЦИЈАЛНА ФАРМАЦИЈА И ИСТРАЖИВАЊЕ ФАРМАЦЕУТСКЕ ПРАКСЕ

пријавио је докторску дисертацију под називом:

„Утицај пандемије COVID-19 на пословање фармацеутске индустрије и доступност лекова у земљама Западног Балкана“

из научне области: СОЦИЈАЛНА ФАРМАЦИЈА И ИСТРАЖИВАЊЕ ФАРМАЦЕУТСКЕ ПРАКСЕ

Универзитет је дана 14.09.2021.године својим актом под бр. 02-01 број 61206-3485/2-21 дао сагласност на предлог теме докторске дисертације која је гласила:

„Утицај пандемије COVID-19 на пословање фармацеутске индустрије и доступност лекова у земљама Западног Балкана“

Име и презиме ментора : Др сц. Драгана Лакић, редовни професор, Универзитет у Београду – Фармацеутски факултет (Ужа научна област: Социјална фармација и фармацеутска пракса)

Комисија за оцену докторске дисертације именована је на седници одржаној 18.06.2026.године одлуком факултета под бр. 01 бр.1406/2, у саставу:

Име и презиме члана комисије	звање	научна област	Установа у којој је запослен
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1. Др сц. Душанка Крајновић, редовни професор, Универзитет у Београду - Фармацеутски факултет (Ужа научна област: Социјална фармација и фармацеутска пракса), председник Комисије
2. Др сц. Валентина Маринковић, редовни професор, Универзитет у Београду - Фармацеутски факултет (Ужа научна област: Социјална фармација и фармацеутска пракса)
3. Др сц. Слободан Јанковић, редовни професор, Универзитет у Крагујевцу – Факултет медицинских наука (Ужа научна област: Фармакологија са токсикологијом; клиничка фармација)

Напомена: уколико је члан Комисије у пензији навести датум пензионисања.

Датум стављања извештаја Комисије и докторске дисертације на увид јавности: 09.07.2026.године.

Наставно-научно веће факултета усвојило је извештај Комисије за оцену докторске дисертације наследници одржаној дана 10.09.2026.године.

Комисија за одбрану докторске дисертације именована је на седници одржаној 18.06.2026.године

одлуком факултета под бр. 01 број 1406/2, у саставу:

Име и презиме члана комисије	звање	научна област	Установа у којој је запослен
1. <u>Др сц. Душанка Крајновић, редовни професор, Универзитет у Београду - Фармацеутски факултет (Ужа научна област: Социјална фармација и фармацеутска пракса), председник Комисије</u>			
2. <u>Др сц. Валентина Маринковић, редовни професор, Универзитет у Београду - Фармацеутски факултет (Ужа научна област: Социјална фармација и фармацеутска пракса)</u>			
3. <u>Др сц. Слободан Јанковић, редовни професор, Универзитет у Крагујевцу – Факултет медицинских наука (Ужа научна област: Фармакологија са токсикологијом; клиничка фармација)</u>			

Напомена: уколико је члан Комисије у пензији навести датум пензионисања.

ДЕКАН ФАКУЛТЕТА

- Прилози:
1. Одлука Наставно-научног већа о усвајању извештаја Комисије за оцену докторске дисертације и одлука о именовању Комисије за одбрану докторске дисертације
 2. Извештај Комисије о оцени докторске дисертације
 3. Примедбе на извештај Комисије о оцени докторске дисертације (уколико их је било) и мишљење Комисије о примедбама

Напомена: Факултет доставља Универзитету захтев са прилозима у електронској форми и у једном писаном примерку за архиву Универзитета

УНИВЕРЗИТЕТ У БЕОГРАДУ
ФАРМАЦЕУТСКИ ФАКУЛТЕТ
11000 - БЕОГРАД
Ул. Војводе Степе 450.
01. број 2256/1
10.09.2026. године

На основу члана 28. Статута и предлога Комисије за последипломске студије – докторске студије, Наставно-научно веће Универзитета у Београду – Фармацеутског факултета на седници одржаној 10.09.2026.године, донело је

О Д Л У К У

ПРИХВАТА СЕ позитиван извештај Комисије за оцену и одбрану завршене докторске дисертације, кандидата **маг.фармације Миленковић Јоване** под насловом: „**Утицај пандемије COVID-19 на пословање фармацеутске индустрије и доступност лекова у земљама Западног Балкана**“ и упућује Већу научних области медицинских наука на усвајање, а по добијеној писаној сагласности одобрава јавна одбрана пред Комисијом у саставу:

1. Др сц. Душанка Крајновић, редовни професор, Универзитет у Београду - Фармацеутски факултет (Ужа научна област: Социјална фармација и фармацеутска пракса), председник Комисије
2. Др сц. Валентина Маринковић, редовни професор, Универзитет у Београду - Фармацеутски факултет (Ужа научна област: Социјална фармација и фармацеутска пракса)
3. Др сц. Слободан Јанковић, редовни професор, Универзитет у Крагујевцу – Факултет медицинских наука (Ужа научна област: Фармакологија са токсикологијом; клиничка фармација)

Универзитет је дана 14.09.2021.године својим актом бр.: 02-01 бр: 61206-3485/2-21 дао сагласност на предлог теме докторске дисертације.

Кандидат маг. фарм. Јована Миленковић, објавила је резултате из ове докторске дисертације у два рада категорије М22 у међународним часописима са СЦИ листе:

1. **Milenković J, Lakić D.** Analysis of the Economic Situation of the South East European Pharmaceutical Industry. *Journal of Medical Economics*. 2020;23(9):932–939.doi: 10.1080/13696998.2020.1730655
IF (2020) = 2,448; Health Care Sciences & Services (67/107); M22
2. **Milenković J, Lakić D, Bogavac N.** Analysis of the Professional Aspects of Medical Drugs Industry in the Republic of Serbia in Times of COVID-19 Pandemic. *Sustainability*. 2023;15(11):8584. doi: 10.3390/su15118584
IF (2023) = 3,6; Environmental Studies (71/174); M22

Одлуку доставити: кандидату, Универзитету, члановима комисије, декану, секретару, продекану за последипломске студије, Одсеку за наставу и студентска питања, ментору (Проф. др Драгана Лакић), Одсеку за правне и опште послове, пословном секретару,

председнику Комисије за последипломске студије – докторске студије (Проф. др Биљана Антонијевић) и архиви.

**ПРЕДСЕДНИК
НАСТАВНО-НАУЧНОГ ВЕЋА
ФАРМАЦЕУТСКОГ
ФАКУЛТЕТА**

**Проф. др Наташа Богавац
Станојевић**

**НАСТАВНО-НАУЧНОМ ВЕЋУ
ФАРМАЦЕУТСКОГ ФАКУЛТЕТА УНИВЕРЗИТЕТА У БЕОГРАДУ**

КОМИСИЈИ ЗА ПОСЛЕДИПЛОМСКУ НАСТАВУ – ДОКТОРСКЕ СТУДИЈЕ

На седници Наставно-научног већа Фармацеутског факултета Универзитета у Београду, одржаној 18. јуна 2026. године (одлука бр. 1406/1), именовани су чланови Комисије за оцену и одбрану завршене докторске дисертације кандидата маг. фарм. Јоване Миленковић, под насловом: „Утицај пандемије **COVID-19** на пословање фармацеутске индустрије и доступност лекова у земљама Западног Балкана“. Ова докторска теза урађена је под менторством др. сц. Драгане Лакић, редовног професора Универзитета у Београду – Фармацеутски факултет.

Чланови комисије за оцену и одбрану докторске дисертације у саставу:

1. **Др сц. Душанка Крајновић**, редовни професор, Универзитет у Београду – Фармацеутски факултет (ужа научна област: Социјална фармација и фармацеутска пракса), председник Комисије
2. **Др сц. Валентина Маринковић**, редовни професор, Универзитет у Београду – Фармацеутски факултет (ужа научна област: Социјална фармација и фармацеутска пракса)
3. **Др сц. Слободан Јанковић**, редовни професор, Универзитет у Крагујевцу – Факултет медицинских наука (ужа научна област: Фармакологија са токсикологијом; клиничка фармација)

прегледали су приложену дисертацију и пропратну документацију и подносе Наставно-научном већу Универзитета у Београду – Фармацеутског факултета следећи:

ИЗВЕШТАЈ

Кандидат Јована З. Миленковић рођена је 12. августа 1989. године у Пожаревцу, где је завршила средњу школу. Интегрисане академске студије завршила је 2013. године на Универзитету у Београду – Фармацеутском факултету. Кандидат има више од једанаест година радног искуства у области фармације, које обухвата рад у апотеци, као и послове у области набавке лекова и медицинских средстава. Од новембра 2023. године запослена је у Министарству одбране Републике Србије.

1. ПРИКАЗ САДРЖАЈА ДОКТОРСKE ДИСЕРТАЦИЈЕ

Докторска дисертација кандидата Јоване Миленковић под насловом „Утицај пандемије COVID-19 на пословање фармацеутске индустрије и доступност лекова у земљама Западног Балкана“, написана је јасним и прегледним стилем на 128 страна, формата А4, фонтом *Times New Roman*, величине 12 и једноструким проредом. У склопу дисертације приказано је укупно 39 табела, 22 слике и 134 литературна навода. Дисертација садржи следећа поглавља: Увод, Циљеви, Методологија, Резултати, Дискусија, Закључци и Литература.

На почетку дисертације представљен је Сажетак рада на српском и енглеском језику и садржај, док се на крају налази прилог, кратка биографија кандидата и потписане изјаве кандидата о ауторству, истоветности штампане и електронске верзије и коришћењу докторске дисертације.

Увод докторске дисертације садржи свеобухватан преглед релевантних литературних података из области фармацеутске индустрије, са посебним освртом на њен значај за функционисање здравственог система, економски развој и међународне трговинске токове. У уводном делу дефинисани су фармацеутски и медицински производи, као и појам доступности лекова, у складу са научном литературом.

Пословање фармацеутске индустрије обухвата истраживање и развој, производњу, регистрацију, дистрибуцију и промет лекова и медицинских производа, уз регулаторну усаглашеност и тржишно позиционирање фармацеутских компанија. У оквиру увода анализирани су основни економски и структурни показатељи развоја фармацеутске индустрије на глобалном нивоу, уз осврт на специфичности пословања у земљама Европске уније, Западног Балкана и Републике Србије. Посебна пажња посвећена је инвестицијама, истраживању и развоју (енгл. *Research and Development, R&D*), дигиталној трансформацији и технолошким иновацијама као кључним факторима конкурентности.

Даље су разматрани фактори који утичу на конкурентски положај фармацеутског сектора на међународном тржишту, укључујући компаративне предности у спољној трговини, извозну структуру, регулаторни оквир, мере државне подршке и процесе међународних интеграција. Посебно је обрађен концепт откривене компаративне предности (енгл. *Revealed Comparative Advantage, RCA*) као индикатора извозне конкурентности.

Такође су анализирани савремени трендови у фармацеутској индустрији, који обухватају дигитализацију пословних процеса, примену вештачке интелигенције, паметну производњу, персонализовану медицину и телемедицину, као и нове modele организације рада. Посебно су разматрани процеси интеграције и консолидације у сектору, значај система квалитета и улога отпорних ланаца снабдевања.

Указано је и на етичке и регулаторне аспекте пословања фармацеутских компанија, као и на њихову друштвену одговорност у обезбеђивању безбедних, ефикасних и квалитетних лекова. Анализиран је утицај пандемије Корона вируса 2019 (енг. *Coronavirus Disease 2019, COVID-19*) на фармацеутски сектор, са освртом на поремећаје

у ланцима снабдевања, производњи и дистрибуцији, као и на промене у тржишним структурама и пословним моделима.

Истакнути су кључни изазови, попут несташица лекова, прекида у снабдевању сировинама и кашњења у регулаторним процедурама, али и позитивни ефекти кризе који се огледају у убрзаној дигитализацији, интензивирању истраживања и развоја и јачању иновационих капацитета.

На крају увода указује се на значај даљих истраживања утицаја пандемије *COVID-19* на пословање фармацеутског сектора и доступност лекова у земљама Западног Балкана, уз примену различитих аналитичких приступа који обухватају економске аспекте, извозну конкурентност и структурне промене у сектору, како би се боље сагледали међусобни односи ових фактора и њихов утицај на доступност и континуитет снабдевања лековима, као и на стабилност фармацеутског ланца снабдевања у посматраном региону.

Циљеви истраживања у оквиру ове докторске дисертације дефинисани су у складу са актуелним научним сазнањима у области фармакоекономије и усмерени су на свеобухватније сагледавање утицаја пандемије *COVID-19* на функционисање фармацеутског сектора, као и на анализу фактора који утичу на доступност лекова у земљама Западног Балкана.

Циљеви истраживања су јасно дефинисани и подељени на четири целине:

1. Анализа компаративне предности и најзначајнијих група производа фармацеутске индустрије у спољнотрговинској размени земаља Западног Балкана, са посебним освртом на конкурентност фармацеутског сектора на међународном тржишту лекова.
2. Анализа утицаја пандемије *COVID-19* на пословне активности и одабране економске параметре фармацеутске индустрије у Републици Србији. У оквиру овог циља испитиване су разлике у ставовима запослених у иновативним и генеричким фармацеутским компанијама у погледу специфичности пословања током пандемије *COVID-19*, као и фактори који могу довести до угрожавања професионалне репутације фармацеутских компанија.
3. Анализа утицаја пандемије *COVID-19* на будуће пословне активности и одабране економске параметре фармацеутске индустрије у Републици Србији, са посебним освртом на промене у ставовима запослених о условима пословања након проглашења завршетка пандемије.
4. Анализа уверења и ставова одговорних лица у фармацеутским компанијама о ефектима пандемије *COVID-19* на пословне активности и доступност лекова пацијентима.

Поред наведених општих циљева, дефинисани су и специфични циљеви истраживања који су усмерени на испитивање разлика у ставовима запослених у иновативним и генеричким фармацеутским компанијама, идентификацију независних варијабли које предвиђају угрожавање професионалне репутације компанија током пандемије *COVID-19*, као и процену промена у ставовима запослених о специфичностима пословања након завршетка пандемије.

У поглављу **Методологија** наведено је да су за реализацију истраживања примењени различити научни приступи у складу са постављеним циљевима. За први циљ спроведена је упоредна анализа откривене компаративне предности заснована на индексу RCA, којим је анализирана спољнотрговинска позиција фармацеутских производа земаља Западног Балкана, Централне и Источне Европе и Републике Србије у периоду 2015–2024. године. Подаци су преузети из Базе података Уједињених нација о међународној трговини (енгл. *United Nations Comtrade Database*, UN Comtrade) и базе Међународног трговинског центра (енгл. *International Trade Centre*, ITC). За класификацију производа коришћени су Хармонизовани систем (енгл. *Harmonized System*, HS) и Стандардна међународна трговинска класификација (СМТК, енгл. *Standard International Trade Classification*, SITC). Анализом су обухваћени производи из HS поглавља 30 – фармацеутски производи, док је RCA индекс коришћен за процену релативне конкурентности и идентификацију група производа са израженим извозним потенцијалом.

За други, трећи и четврти циљ спроведено је анкетно истраживање у фармацеутским компанијама у Републици Србији. Упитник је обухватио 30 питања распоређених у пет тематских целина које се односе на карактеристике компанија, економске параметре пословања током и након пандемије COVID-19, специфичности фармацеутског пословања, ставове о доступности лекова и здравствене заштите, као и процене будућих пословних трендова. Подаци су прикупљени од иновативних и генеричких фармацеутских компанија, а анализа је обухватила поређење ставова запослених, као и идентификацију фактора који утичу на пословну одрживост и професионалну репутацију.

Статистичка обрада података извршена је применом дескриптивне статистике, χ^2 теста и бинарне логистичке регресије у софтверском пакету SPSS. Наведене методе омогућиле су утврђивање статистички значајних разлика између група и идентификацију предиктора који утичу на пословне резултате и перцепцију фармацеутског сектора у условима кризе. Примењене статистичке методе омогућиле су испитивање статистички значајних разлика између иновативних и генеричких фармацеутских компанија, идентификацију фактора који утичу на професионалну репутацију, као и анализу промена ставова запослених током и након пандемије COVID-19.

Дискусија је обухватила анализу добијених резултата и њихово поређење са резултатима релевантних истраживања. Приказане су предности и ограничења спроведеног истраживања, као и смернице за будућа истраживања.

Поглавље **Закључак** садржи сажет приказ најзначајнијих налаза истраживања који су у складу са постављеним циљевима докторске дисертације.

У оквиру поглавља **Литература** наведена су 134 литаратурна навода која су коришћена током израде докторске дисертације.

Прилог садржи додатне табеларне приказе резултата истраживања.

Биографија садржи кратку биографију кандидата.

На самом крају докторске дисертације налазе се неопходне изјаве сходно Правилнику о докторским студијама Универзитета у Београду.

2. ОПИС ПОСТИГНУТИХ РЕЗУЛТАТА

У поглављу **Резултати** приказани су резултати према претходно дефинисаним циљевима истраживања.

Први циљ

Резултати истраживања у оквиру првог циља указују на то да фармацеутски сектор земаља Западног Балкана у посматраном периоду није остварио изражену компаративну предност у спољнотрговинској размени. Вредности RCA индекса су код свих земаља углавном негативне, што потврђује структурну увозну зависност и ограничену извозну конкурентност. У анализи динамике спољнотрговинске размене утврђено је да је у периоду 2015–2024. године извоз фармацеутских производа растао у свим земљама Западног Балкана, али уз истовремено бржи раст увоза. Србија као највећа економија региона бележи раст извоза од приближно 8,50% годишње, док је раст увоза износио око 10,71% годишње, што је довело до продубљивања спољнотрговинског дефицита. Босна и Херцеговина бележи умерен раст извоза од 7,18% годишње, уз раст увоза од 6,58%, док Црна Гора остварује најдинамичнији раст извоза од 20,17% годишње, али и истовремено висок раст увоза од 13,10%. Анализа RCA индекса показује да су све земље Западног Балкана у 2024. години имале негативне вредности индекса: Албанија (-1,36), Босна и Херцеговина (-0,89), Црна Гора (-0,25), Србија (-0,95) и Северна Македонија (-0,27). Иако се код појединих земаља, попут Северне Македоније (побољшање са -0,49 на -0,27) и Албаније (са -1,69 на -1,36), уочава позитиван тренд побољшања, он није довољан за достизање компаративне предности. Највећи структурни изазов представља чињеница да је раст увоза у већини земаља између 8% и 11% годишње, што је у просеку више или једнако расту извоза, што додатно одржава негативан RCA индекс. Сходно томе, може се закључити да први циљ истраживања потврђује одсуство компаративне предности фармацеутског сектора Западног Балкана, уз истовремено постојање умерених, али недовољних тенденција побољшања у појединим земљама региона.

Други циљ

У циљу анализе пословних и организационих промена у фармацеутским компанијама током пандемије COVID-19, испитивани су кључни аспекти функционисања предузећа, укључујући промене у броју запослених, начину рада и организацији пословних процеса. Резултати истраживања показују да је 55,6% компанија имало више од 25 запослених, док је 37,0% припадало категорији мањих компанија са мање од 25 запослених. У погледу организације рада, 55,6% компанија је пријавило да је до 20% запослених било одсутно са посла услед пандемије, док је 44,4% компанија имало више од 20% одсутних

запослених. Добијени резултати указују на значајан утицај пандемије на радну ангажованост и организацију рада у фармацеутском сектору. Резултати даље показују да је 44,4% компанија задржало традиционални модел рада без значајног увећања рада од куће, док је 30,0% компанија увело или задржало хибридни модел рада. Само мањи део компанија (15,0%) је у већој мери примењивао рад на даљину, што указује на ограничену, али присутну дигиталну трансформацију радних процеса.

Трећи циљ

У оквиру анализе финансијских перформанси фармацеутских компанија током пандемије *COVID-19*, резултати показују релативну стабилност пословања. Пре пандемије, 55,6% компанија је остваривало приход до 8 милиона EUR, док је 44,4% имало приход изнад тог износа. Током пандемије, 33,3% компанија је остварило повећање прихода до 10%, а исти проценат компанија забележио је раст прихода већи од 10%. Смањење прихода од 10% и више регистровано је код 14,8% компанија, што указује да већина предузећа није претрпела значајан пад прихода. Истовремено, дошло је до раста трошкова код већине компанија, при чему је 33,3% пријавило повећање до 10%, а 33,3% повећање веће од 10%. Само 7,4% компанија је задржало исте трошкове. Добијени резултати указују на повећан трошковни притисак, али уз очувану укупну финансијску стабилност сектора. Анализа финансијских показатеља указује да фармацеутски сектор у Србији током посматраног периода показује висок степен отпорности на кризне услове. Иако су поремећаји у ланцима снабдевања и повећање оперативних трошкова били присутни, већина компанија је успела да одржи континуитет пословања без значајнијих губитака у приходима. Ово указује на релативно стабилну структуру тржишта, као и на способност компанија да се прилагоде измењеним условима пословања.

Четврти циљ

У циљу сагледавања перцепције пословних ризика и организационих изазова, анализирани су ставови испитаника о утицају пандемије *COVID-19* на пословање. Резултати показују да 81,5% компанија није имало финансијске потешкоће након избијања пандемије, док је 18,5% навело одређене финансијске проблеме. Најчешћи оперативни изазови били су логистичке природе (48,1%), док је 33,3% компанија пријавило друге врсте проблема. У погледу снабдевања, 70,4% компанија је пријавило кашњења у увозу лекова и медицинских средстава, што указује на значајне поремећаје у ланцу снабдевања. Истовремено, уочен је висок степен дигиталне трансформације, при чему је 74,1% компанија увело телемедицину, а 70,4% развило нове здравствене технологије. Са друге стране, 92,6% компанија није значајно повећало улагања у истраживање и развој. У дугорочном периоду, већина компанија (59,26%) не идентификује значајне текуће последице пандемије, док преостали део и даље указује на присутне логистичке и снабдевачке изазове, што указује на делимично трајне ефекте кризе.

3. УПОРЕДНА АНАЛИЗА РЕЗУЛТАТА ДИСЕРТАЦИЈЕ СА ПОДАЦИМА ИЗ ЛИТЕРАТУРЕ

Резултати добијени у оквиру првог циља истраживања, који се односио на анализу компаративне предности фармацеутског сектора земаља Западног Балкана, показали су да ниједна од анализираних земаља није остварила позитивне вредности *RCA* индекса, што указује на ограничену конкурентност и изражену увозну зависност. Ови резултати су у складу са бројним истраживањима која указују да су земље Западног Балкана, а посебно током пандемије *COVID-19*, биле изложене значајним поремећајима у снабдевању лековима и ограниченој доступности здравствених услуга (1–3). Током периода пандемије дошло је до значајних организационих промена у функционисању здравствених установа, што је довело до отежаног приступа лекарима, специјалистичким прегледима и појединим терапијама. Посебно је уочено да су пацијенти са хроничним и малигним обољењима били изложени одлагању дијагностике и лечења, што је у складу са налазима других студија које указују да је пандемија довела до смањења обима не-*COVID-19* здравствених услуга (4–7). Поред тога, резултати ове дисертације указују на значајне проблеме у доступности есенцијалних лекова, укључујући кашњења у увозу, ограничене залихе и несташице појединих препарата. Ови налази су у потпуности у складу са међународним истраживањима која указују на глобалне поремећаје у ланцима снабдевања лековима и медицинским средствима (8–10). Све наведено указује да је пандемија имала вишеслојан утицај на континуитет лечења и доступност здравствене заштите, како у развијеним тако и у земљама у развоју.

Други циљ истраживања односио се на анализу организационих промена у фармацеутским компанијама током пандемије *COVID-19*. Добијени резултати показују да су компаније биле изложене значајним оперативним и логистичким изазовима, што је у потпуности у складу са резултатима ранијих домаћих и међународних истраживања (8–12). Најчешће потешкоће односиле су се на поремећаје у ланцу снабдевања, кашњења у увозу, повећање трошкова пословања и нестабилност тржишта, што је било присутно у већини здравствених система на глобалном нивоу. Глобални ланци снабдевања током пандемије били су посебно осетљиви на прекиде у транспорту, ограничења извоза и зависност од појединих производних центара (9–12). Слични налази добијени су и у овој дисертацији, где су испитаници истакли проблеме у доступности лекова и медицинских средстава, као и кашњења у увозним процедурама. Упркос наведеним изазовима, фармацеутски сектор је показао релативно висок ниво отпорности и стабилности, што је у складу са истраживањима која указују да је ова индустрија била мање погођена у односу на друге привредне секторе (13–15). Већина компанија је успела да одржи континуитет пословања, док је део њих остварио и раст прихода, што се у литератури објашњава повећаном потражњом за лековима и релативно стабилном природом фармацеутског тржишта (16,17). Ови резултати додатно указују да је фармацеутски сектор у кризним условима функционисао као један од стратешки најстабилнијих делова привреде, што је у складу са његовом друштвено-здравственом улогом и регулаторном специфичношћу (13,16,18). Управо та комбинација регулаторне контроле, континуиране потражње и критичне природе производа допринела је очувању релативне стабилности сектора. У ширем контексту, добијени резултати указују да је пандемија *COVID-19*

додатно истакла структурне слабости здравствених система, посебно у домену зависности од увоза и недовољно развијених домаћих производних капацитета. Ови налази су од посебног значаја за креирање будућих здравствених и индустријских политика, јер указују на потребу јачања отпорности система кроз диверзификацију извора снабдевања, улагања у домаћу производњу и унапређење стратешких резерви лекова и медицинских средстава (19–21).

Трећи циљ истраживања односио се на анализу финансијских перформанси фармацеутских компанија током пандемије *COVID-19*. Резултати дисертације показују да је пандемија значајно убрзала дигиталну трансформацију фармацеутског сектора, што је у складу са резултатима ранијих истраживања (22–24). Уведени су рад на даљину, хибридни модели рада и интензивнија примена дигиталних платформи за комуникацију и организацију пословних процеса. Ове промене омогућиле су континуитет рада у условима ограниченог физичког контакта, али су истовремено истакле разлике у нивоу дигиталне зрелости између земаља. У литератури се наводи да је брзина дигиталне трансформације директно повезана са развијеношћу инфраструктуре и степеном технолошке припремљености система (22–25). У Републици Србији, као и у другим земљама средњег нивоа развоја, имплементација дигиталних решења била је постепена, што се доводи у везу са ограниченим инвестицијама у информационо-комуникационе технологије и недовољном интеграцијом дигиталних система у здравству и фармацији (24,25). Истовремено, међународне студије наглашавају да је пандемија деловала као катализатор дигиталне трансформације у здравству и фармацеутској индустрији (23,24).

Четврти циљ истраживања односио се на анализу стратешких промена, иновација и дугорочне отпорности фармацеутског сектора након пандемије. Резултати истраживања показују да су иновације, истраживање и развој имали кључну улогу у прилагођавању фармацеутског сектора кризним условима, што је у складу са ранијим студијама (16,17,26). Компаније које су интензивније улагале у нове технологије, дигитална решења и развој производа показале су већу отпорност на поремећаје у ланцу снабдевања. Пандемија *COVID-19* је убрзала редефинисање стратешких приоритета у фармацеутској индустрији, при чему је посебно наглашена потреба за диверзификацијом извора снабдевања, јачањем локалних производних капацитета и развојем отпорнијих логистичких система (17,19,27). Литература указује да су системи који су имали развијене механизме управљања ризицима и кризним ситуацијама показали већу стабилност током пандемије (27,28). Такође, резултати дисертације показују да је дошло до повећаног улагања у дигиталне технологије, аутоматизацију производње и иновације, што је у складу са глобалним трендовима у фармацеутској индустрији (16,17,29). Ове промене нису биле само краткорочне, већ су у великом броју случајева довеле до трајне трансформације пословних модела и јачања организационе отпорности. Додатно, међународна литература наглашава да су компаније које су убрзале иновационе процесе током кризе оствариле боље дугорочне резултате и већу конкурентност на тржишту (26,27,30). У том контексту, резултати ове дисертације потврђују да иновације представљају један од кључних фактора одрживости фармацеутског сектора, као и дугорочне стабилности у условима глобалних поремећаја.

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4. ОБЈАВЉЕНИ И САОПШТЕНИ РЕЗУЛТАТИ КОЈИ ЧИНЕ САСТАВНИ ДЕО ДОКТОРСKE ДИСЕРТАЦИЈЕ

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Milenković J, Lakić D. Analysis of the Economic Situation of the South East European Pharmaceutical Industry. *Journal of Medical Economics*. 2020;23(9):932–939.

doi: 10.1080/13696998.2020.1730655

Назив часописа: *Journal of Medical Economics*

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Milenković J, Lakić D, Bogavac N. Analysis of the Professional Aspects of Medical Drugs Industry in the Republic of Serbia in Times of *COVID-19* Pandemic. *Sustainability*. 2023;15(11):8584.

doi: 10.3390/su15118584

Назив часописа: *Sustainability*

Област: Environmental Studies (71/174)

Импакт фактор: IF (2023) = 3,6

5. ЗАКЉУЧАК – ОБРАЗЛОЖЕЊЕ НАУЧНОГ ДОПРИНОСА ДОКТОРСKE ДИСЕРТАЦИЈЕ

На основу детаљне анализе приложене докторске дисертације, чланови Комисије закључују да приказани резултати, дискусија и закључци представљају значајан научни допринос у области истраживања фармацеутског сектора у Републици Србији, са посебним освртом на спољнотрговинске токове, компаративне предности, дигиталну трансформацију и утицај пандемије *COVID-19* на структурне и економске перформансе сектора.

Истраживање указује да фармацеутски сектор у Републици Србији карактерише изражена увозна зависност и ограничена извозна конкурентност, уз присутне структурне дисбалансе у спољнотрговинској размени. Увоз фармацеутских производа доминира, док је извоз ограничен на ужи спектар производа и релативно мали број извозних тржишта, што указује на недовољну диверзификацију производне базе, као и на ограничене капацитете за снажније позиционирање на међународном тржишту.

Резултати анализе компаративних предности показују неповољну међународну позицију сектора, при чему вредности *RCA* индикатора доследно указују на одсуство изражене конкурентске предности. Кључни ограничавајући фактори односе се на недовољан интензитет улагања у истраживање и развој, технолошко заостајање, као и ограничен степен усаглашености са међународним регулаторним и квалитетним стандардима, што у значајној мери утиче на извозне перформансе и укупну тржишну позицију сектора.

Пандемија *COVID-19* је додатно истакла постојеће структурне слабости сектора, пре свега кроз поремећаје у ланцима снабдевања, логистичким и дистрибутивним токовима, као и кроз повећану зависност од увоза критичних фармацеутских производа. Иако је систем у значајној мери очувао функционалност и обезбедио континуитет снабдевања, уочена је ограничена отпорност домаће производне базе у условима кризе, што указује на потребу јачања капацитета за управљање ризицима и обезбеђивање стабилности снабдевања.

Дигитална трансформација представља један од кључних развојних праваца у савременом периоду, али је ниво дигиталне зрелости сектора и даље недовољно развијен. Ово се одражава на ефикасност пословних, административних и логистичких процеса, као и на степен интеграције савремених информационо-комуникационих технологија у свакодневно функционисање сектора. Поред тога, уочене су ограничене и недовољно развијене везе између научно-истраживачког сектора и фармацеутске индустрије, што додатно успорава трансфер знања, примену иновација и дугорочно јачање конкурентности.

Посебно се наглашава да недовољна улагања у истраживање и развој, заједно са структурним, институционалним и регулаторним ограничењима, представљају кључне факторе који условљавају спорији раст и ограничену извозну конкурентност сектора. У регионалном контексту, резултати показују да Централноевропски споразум о слободној трговини (енг. *Central European Free Trade Agreement*, CEFTA) остварује релативно повољније резултате у односу на развијенија међународна тржишта, што упућује на постојање ограничених, али значајних развојних потенцијала за даље јачање извозне позиције.

На основу резултата истраживања, закључује се да ова дисертација доприноси свеобухватнијем и систематичнијем разумевању фактора који утичу на конкурентност фармацеутског сектора Србије, као и идентификацији његових кључних структурних ограничења и развојних потенцијала. Свеукупно, научни допринос огледа се у интегрисаној анализи спољнотрговинских, структурних и развојних карактеристика сектора, као и у сагледавању утицаја дигиталне трансформације и кризних (пандемијских) шокова на његову дугорочну одрживост и развојну перспективу.

5.1 ОЦЕНА ИЗВЕШТАЈА О ПРОВЕРИ ОРИГИНАЛНОСТИ ДОКТОРСKE ДИСЕРТАЦИЈЕ

На основу извештаја о провери оригиналности докторске дисертације Јоване З. Миленковић, под насловом: „Утицај пандемије *COVID-19* на пословање фармацеутске индустрије и доступност лекова у земљама Западног Балкана“, коришћењем програма *iThenticate* утврђено подудараре текста износи 5 %. Овај степен подударности последица је цитата, библиографских података о коришћеној литератури, општих места и података, као и претходно публикованих резултата докторандових

истраживања, који су проистекли из његове дисертације, што је у складу са чланом 9. Правилника о поступку провере оригиналности докторских дисертација које се бране на Универзитету у Београду.

Сходно томе, може се извести закључак да је приложена докторска дисертација кандидата Јоване З. Миленковић оригинално научно дело.

6. МИШЉЕЊЕ И ПРЕДЛОГ КОМИСИЈЕ

На основу изложеног, Комисија закључује да је докторска дисертација кандидата маг. фарм. Јоване Миленковић, чија је израда одобрена на седници Већа научних области медицинских наука Универзитета у Београду (одлука бр 61206-3485/2-21 од 14. 09. 2021. године), урађена према одобреној пријави и задовољава критеријуме оригиналног научног дела. Кандидат је успешно реализовао постављене циљеве истраживања, а резултати приказани у овој докторској дисертацији представљају оригинално и самостално научно дело са значајним научним доприносом у области социјалне фармације и фармацеутске праксе. **Резултати докторске дисертације публиковани су у два научна рада објављена у међународним научним часописима категорије M22.**

Комисија у наведеном саставу позитивно оцењује докторску дисертацију маг. фарм. **Јоване Миленковић** под насловом: „Утицај пандемије **COVID-19** на пословање фармацеутске индустрије и доступност лекова у земљама Западног Балкана“ и предлаже Наставно-научном већу Фармацеутског факултета, Универзитета у Београду да прихвати овај Извештај о израђеној докторској дисертацији и упути га Већу научних области медицинских наука ради добијања сагласности за јавну одбрану докторске дисертације.

03.07.2026. год.

Комисија за оцену и одбрану докторске дисертације

Др сц. Душанка Крајновић
редовни професор, Универзитет у Београду - Фармацеутски факултет, председник
Комисије

Др сц. Валентина Маринковић
редовни професор, Универзитет у Београду - Фармацеутски факултет

Др сц. Слободан Јанковић
редовни професор, Универзитет у Крагујевцу - Факултет медицинских наука

ОЦЕНА ИЗВЕШТАЈА О ПРОВЕРИ ОРИГИНАЛНОСТИ ДОКТОРСКЕ ДИСЕРТАЦИЈЕ

На основу Правилника о поступку провере оригиналности докторских дисертација које се бране на Универзитету у Београду и налаза у извештају из програма iThenticate којим је извршена провера оригиналности докторске дисертације „Утицај пандемије COVID-19 на пословање фармaceutске индустрије и доступност лекова у земљама Западног балкана”, аутора Јоване З. Миленковић, констатујем да утврђено подударане текста износи 5%. Овај степен подударности последица је цитата, библиографских података о коришћеној литератури, општих места и података, као и претходно публикованих резултата докторандових истраживања, који су проистекли из његове дисертације, што је у складу са чланом 9. Правилника.

На основу свега изнетог, а у складу са чланом 8. став 2. Правилника о поступку провере оригиналности докторских дисертација које се бране на Универзитету у Београду, изјављујем да извештај указује на оригиналност докторске дисертације, те се прописани поступак припреме за њену одбрану може наставити.

25. јун 2026. године

Ментор:


Проф. др Драгана Лакић

УНИВЕРЗИТЕТ У БЕОГРАДУ – ФАРМАЦЕУТСКИ ФАКУЛТЕТ

ИЗЈАВА МЕНТОРА

Истраживање спроведене у оквиру докторске дисертације кандидата магистра фармација Јоване З. Миленковић под називом „Утицај пандемије COVID-19 на пословање фармaceutске индустрије и доступност лекова у земљама Западног Балкана“ није рађено у здравственој установи са пацијентима, нити са биолошким материјалом.

Београд, 02. јул 2026. године

Ментор:



Проф. др Драгана Лакић



Analysis of the economic situation of the South East European pharmaceutical industry

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REVIEW ARTICLE

Analysis of the economic situation of the South East European pharmaceutical industry

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ABSTRACT

Background: The pharmaceutical industry in the countries of Southeast Europe is still underdeveloped. Despite experience and tradition as well as significant research efforts and innovation potential, there are still big differences among the companies in the pharmaceutical sector of the SEE countries. It is for this reason that the subject of the study is the analysis of the comparative advantage in exports of the pharmaceutical sector of the SEE countries.

Aim: The aim is to point out the potential of the sector and the directions of its development. The study also aims to define the position of the pharmaceutical sector in the SEE countries in today's global context. The study has comprised the pharmaceutical products belonging to group 30 in the HS6 classification and SITC 54 classification in the period 2005–2018.

Conclusions: The results of the study indicate that the SEE countries have negative comparative advantage in exports, in the analysed period, except for Slovenia, which stands out with positive values of the RCA index. The products, dominating the foreign trade of the SEE pharmaceutical sector, belong to the group of Medicaments consisting of mixed or unmixed products for therapeutic or prophylactic uses.

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Introduction

Analysis of the economic situation of the South East European pharmaceutical industry is highly complex, considering the wide micro and macro impacts¹ of the industry, e.g. impacts on the consumers, the manufacturers, related industries, and finally on the global economy. Looking at the pharmaceutical industry from the macroeconomic point of view, we can appropriately treat it as a factor influencing the intensive growth and development of the economy. Investments and research and development (R&D), as the determinants of the pharmaceutical industry development, contribute to increased employment, the development of other sectors of the economy, as well as direct and indirect gross domestic product (GDP) growth². Investments in the pharmaceutical sector generate direct and indirect employment, broad sociological impact, as well as integration and interaction with other industries. Just as strong economies have a positive balance of trade, so the countries with developed pharmaceutical industry have a surplus in pharmaceutical exports.

The pharmaceutical industry seeks to satisfy changing consumption by continuously offering new products on the market. The industry is facing the eternal challenge – to improve and prolong life, and on the other side, to ensure profits increase while reducing costs.

In the transition period, the process of the restructuring and transformation of the pharmaceutical sector companies

was to ensure that strict health, safety, market and other criteria were met in order to make the products competitive in the international market with an appropriate marketing strategy. The transition process in the countries of the Former Yugoslavia (SFRY), the breakup of the country and all that followed, prevented successful market positioning for most of the companies. The large companies fell apart and were replaced by small and medium-sized enterprises that were not able to finance R&D³. However, some of the companies have been successfully transformed and achieved an increase in exports of medicaments and medical products, thus contributing to a larger share of the pharmaceutical sector's exports in the overall foreign trade of the country.

The starting point in the analysis is tradition and positive indicators from Yugoslavia's foreign trade in the pharmaceutical sector, as well as the decline in exports and the foreign trade deficit of the South East Europe (SEE) countries (all except Slovenia), after the breakup of Former Yugoslavia. Dynamic export analysis and in particular the comparative advantage of the exports in the pharmaceutical sector provides empirical data about the sector that can still attract foreign capital and perform the concentration of knowledge and experience. It is for this reason that the subject of this research is the analysis of comparative advantage of the exports in the pharmaceutical sector of the SEE countries. The aim is to highlight both the potential of the sector and the need for management, intensification and modernization.

Therefore, it is necessary to define situation of the pharmaceutical sector of the SEE countries both in today's global framework and in relation to the aforementioned sector of the Fmr Yugoslavia countries. In further research, the level of comparative advantage in exports of the pharmaceutical sector products was measured in order to determine which products have development potential, that is, which products dominate the foreign trade of the SEE countries.

The literature review

There are different approaches to pharmaceutical sector research. Accordingly, some authors conduct research from the point of view of its relevance to economic growth or its impact on the health sector, at foreign direct investments (FDI) level. Other authors in the analysis start from the analysis of competitiveness. In the process of bidding on the market, pharmaceutical manufacturers must offer a quality and often innovative product, reduce costs over competition, and opt for a product or product line in accordance with the wishes and needs of consumers. Competitiveness factors are numerous and affect the position of the company (microeconomic level of competitiveness) or the state (macroeconomic level of competitiveness). We also find in the literature the term of industry competitiveness – the mesoeconomic. Noe et al.⁴ and Békés and Ottaviano⁵ competitiveness at the sectoral level is linked to the results of international trade, while Yaacob⁶ and Safiullin et al.⁷ include in the analysis the term of a comparative advantage of industry and links it to the ability of the industry to gain and maintain market share in the domestic and export markets. For this reason, economic analysis of the state of the pharmaceutical industry in a country or region is also an analysis of the competitiveness indicators of the pharmaceutical industry and indicates the position relative to the same industry in other countries or regions. The study of the competitiveness of the Croatian pharmaceutical industry was conducted by Buturac⁸, who pointed to strong comparative advantage and significant added value in the exports of pharmaceutical products. Econometric analysis was used to assess the main determinants of the exports of the European Union (EU) pharmaceutical products, so Blanc⁹ points to the importance of the size of the country and its health sector, the amount of health expenditure (% of GDP), the degree of infrastructure development, and the like. According to Galović¹⁰, the pharmaceutical sector is the capital-intensive sector of the economy, where the determinants of development are FDI and multinational companies (MNCs). MNCs are constantly looking for new markets¹¹, more favourable business conditions, and also for more flexible laws regarding production and environmental protection¹². On the demand side of the pharmaceutical sector, there are several participants, some of whom acquire their market power through the establishment of legal monopolies, brand loyalty, and adverse selection¹³.

For the purpose of further intensive development of the pharmaceutical sector, it is necessary for the pharmaceutical industry to: promote the transfer of know-how and R&D¹¹, improve the knowledge of the distinctive characteristics of

new markets, market performance and competition, establish partnerships with large clients¹⁰. Yu¹⁴ highlight the product quality and qualification level of the workforce as factors that have positive impact on the development of the pharmaceutical sector, while the lack of FDI has the negative impact on export results of the companies. According to Barbosa et al.¹³ the factors that have a limiting impact on the development of the pharmaceutical sector are high production and qualified workforce costs, lack of investment, and long distribution channels due to numerous intermediaries. In this situation, the country appears on the one hand as the importer of raw materials for the production of generic medicaments, and on the other hand as the exporter of low complexity medicaments. This is exactly what Sushmita¹⁵ confirms and indicates that the country compensates its low production volume by the import of pharmaceutical products and develops foreign trade relations mostly with surrounding countries¹⁶. Also, the improvements in infrastructure and technology will provide a long-term increase in comparative advantage. Considering the problems of the internationalization of pharmaceutical companies, Ji and Ye¹⁷ point out that the strengthening of the companies in the domestic market, that is, the overcoming of the problems of low-profit business, is a starting point for success on the global market. Finally, the authors conclude that it is especially important to overcome market barriers, enable the mobility of the factors, and create an innovative environment. Andrijević Matovac¹⁸ points out that companies wishing to become competitive on international markets, bearing in mind primarily pharmaceutical companies, must have innovative action as their strategic goal. It means that they must work on introducing new products in existing markets, introducing existing products into new markets, development of new technology, motivation and continuous education of employees. Knowledge and experience is also of particular importance for reducing risk on the international scale, as pharmaceutical companies on the market enter the processes leading towards capital consolidation¹⁹. Bakić²⁰ points out that it is exactly the pharmaceutical companies who have shown that success depends on how well they cope with the competition and how much they have adapted to the changes in demand.

Adolfsson²¹ analysed the impact of the membership of a country in a union, such as the EU, on the value of exports. The author points out that there is no statistical significance of the impact of the membership, but that the countries that are members of the customs union pay a lower price per kilogram than other countries. In the pharmaceutical market, the participants exercise their power on the basis of legal monopoly, brand loyalty, and adverse selection²². The authors point out that the pharmaceutical sector depends on the management within healthcare institutions²³ of the country's health care system, or on the fact whether the dominant health care and pharmaceutical sector in the country is private or public. They conclude that strong interactions between manufacturers and distributors create multiple distribution channels, while the legislation related to market concentration often ignores the specific characteristics of the

sector²². The importance of the proper functioning and connection between the state and the pharmaceutical sector is also pointed out by Sudershan²⁴.

On the other hand, the issue of quality is particularly important and pharmaceutical companies are making efforts to offer the patients safe and effective medicaments²⁵. The issue of quality is related to the increase in production on condition that strict directives, continuous monitoring and fighting against counterfeiting and smuggling are observed. In the developing countries in Africa, Asia, Latin America and Eastern Europe, the problem is really serious, as 50% of the medicaments used by the patients are counterfeit, unlike the EU, where it is only 1%. The most frequently counterfeited medicaments are antibiotics, which adversely affects the outcome of the treatment and the development of resistance, C vitamin in Serbia, followed by steroid hormones and anabolics. Ignjatijević²⁶ associates the quality of pharmaceutical products with storing of medicaments and concludes that sensitivity of medicaments further complicates their storing, as the storing conditions of pharmaceutical products differ significantly from other types of goods. The general conclusion would be that, in the coming period, the pharmaceutical industry should: foster knowledge and technology transfer, enhance marketing and other promotional activities, encourage R&D, provide training for researchers, raise awareness of growing markets and competition, especially from Asian countries, and establish strong partnership with large clients.

Methods

The subject of the research is the analysis of the comparative advantage level of exports of the SEE countries' pharmaceutical sector in the international market. The aim of the research is to define the present position of the sector and to point out the products that dominate the foreign trade of the SEE countries.

The research into the comparative advantage of the pharmaceutical sector exports was conducted in accordance with Buturac⁴ and Ignjatijević et al.²⁷ study, that is, the logarithmic form of the comparative advantage of exports was applied. For the purpose of this study, UN Comtrade and ITC data for the respective years were used. According to the UN Conference on Trade and Development classification, pharmaceuticals belong to Group 30 of the HS6 classification (product cluster at digits 2 and 4) or 54 SITC classification (digits 2). Formula for calculating strong comparative advantage²⁸:

$$RCA = \ln \left[\frac{X_i}{M_i} \right] \times \left[\frac{\sum_{i=1}^n X_i}{\sum_{i=1}^n M_i} \right] \times 100$$

In the above formula, X means the value of exports and M means the value of imports. Index i means the pharmaceutical sector as a whole or its products. In case the country specializes in the production of pharmaceuticals and has a surplus in foreign trade, the RCA indicator has positive values and indicates comparative advantage.

Data

Today, the production and trade of pharmaceutical products are dominated by a few countries, which indicates that most countries satisfy their needs by imports. In order to satisfy the ever-increasing demand of the market and to increase profits, the pharmaceutical companies are continuously improving their offerings.

The research results indicate positive movements. According to EFP IA data in the period 2005–2018, in Europe, the pharmaceutical sector production was increasing by an average of 10.89% per year, exports and imports were increasing by 22.59% and 20.27% per year respectively, and the most important, there was the increase in R&D area by an average of 13.84% per year compared to 2005 (Table 1). Considering EU countries, it is important to highlight the increase in production in Switzerland, Germany, Italy and Ireland¹⁰.

The positive tax policy of the countries, harmonized with the inflow of investments has contributed to the efficient development of the pharmaceutical sector in these countries. Thus, the total production of the pharmaceutical sector increased by 45.89% in 2017 compared to 2005, and the employment rate increased by 19.9% (Table 2). Considering the first 5 countries, the largest increase in production is shown in Switzerland, Germany and Italy, and a decrease in production in France and the United Kingdom. When it comes to Ireland, the tax incentives for innovation must be highlighted, which has made the country a leader in pharmaceutical sector investments. There is a 27.46% increase in production, resulting in 24.03% increase in employment in the pharmaceutical sector. The research results show that of the first 10 pharmaceutical companies 7 are in Ireland. In Germany, it is important to point out that the chemical and pharmaceutical industries have a very high share in total exports, as indicated in earlier studies by Ignjatijević²⁶ and Galović¹⁰. The Swedish pharmaceutical sector employs about 5,000 people²⁹, and as a result of increased investments in R&D, it has steady increase in production and exports. It is Adolfsson²¹ who points to a growing trend in exports with some oscillations, concluding that the pharmaceutical industry accounts for 6% of Sweden's total exports. Also, in the case of Sweden, investments play a significant role, with part of the funds being provided by the companies themselves and part funded by the state. A commitment to investment in R&D, resulting in a decrease in imports, has had a positive effect on the decline in trade balance of the country³⁰.

The research below shows the pharmaceutical sector production of the leading countries in the world. The production of pharmaceuticals in the EU is at different levels depending on the country.

Exports of the pharmaceuticals sector of the EU countries are at high levels, with Germany leading with EUR 75.1 billion, followed by Switzerland with EUR 68.4 billion in 2017 (Table 3).

In the period after the 1960s and 1970s of the last century, the pharmaceutical companies of developed countries positioned themselves on the market and modernized their production, which was followed by capital consolidation and

Table 1. Pharmaceutical industry indicators (values in millions of EUR unless otherwise stated).

	2005	2010	2015	2018	Growth rate (%)
Production	171,952	199,131	238,437	260,000	10.89
Exports ^{a,b}	181,560	276,357	365,303	410,000	22.59
Imports	145,766	204,824	269,012	305,000	20.27
Trade balance	35,794	71,533	96,291	105,000	30.87
R&D expenditure	21,732	27,920	33,557	36,500	13.84
Employment (units)	634,546	670,088	739,499	765,000	4.79
R&D employment (units)	99,859	117,036	113,713	115,000	3.59
Total pharmaceutical market value at ex-factory prices	129,515	152,991	193,742	220,000	14.16

Source: EFP IA for relevant years, member associations (official figures) – (e): EFP IA estimate; Eurostat (EU-28 trade data 1995–2015).

^aData relate to EU-28, Norway and Switzerland since 2005 (EU-15 before 2005); Croatia and Serbia included since 2010; Turkey included since 2011.

^bData relating to total exports and total imports include EU-28 intra-trade (double counting in some cases).

Table 2. Production, Employment in the pharmaceutical industry and the number of pharmaceutical production companies in the world (production in millions of EUR; Employment in units).

	2005		2010	2015	2017			%	
	Production value	Employment	Production value	Production value	Production value	Employment	Enterprises – number	Production 2017/2005	Employment 2017/2005
1. Switzerland	16,034	32,038	29,195	42,479	44,944	46,503	182	180.30	45.15
2. Germany	22,653	113,100	26,888	29,536	30,555	117,013	521	34.88	3.46
3. Italy	21,589	74,000	24,996	29,326	31,200	65,400	456 (2016)	44.52	−11.62
4. France	34,316	101,500	23,485	20,554	21,900	98,786	252 (in 2009 there were 859. In 2015 there were 537)	−36.18	−2.67
5. UK	22,935	68,000	19,263	19,313	20,609	63,250	636	−10.14	−6.99
6. Ireland	15,146	24,000	19,700	19,305	19,305	29,766	155 (u 2014)	27.46	24.03
Total	171,952	634,546	200,050	238,437	250,868	760,795		45.89	19.90

Source: EFP IA for relevant year, member associations (official figures) – (e): EFP IA estimate; Eurostat (EU-28 trade data 1995–2015).

Note: All data based on SITC 54; Denmark, Hungary, Norway: 2012 data, Cyprus, Netherlands: 2010 data, Croatia, Denmark, France, Ireland, Italy, Netherlands, Norway, Portugal, Slovenia, Spain, Sweden, Switzerland: estimate Bulgaria, Croatia, Cyprus, France, Germany, Hungary, Ireland, Latvia, Norway, Poland, Portugal, Romania, Slovenia: veterinary products excluded. Database does not include data related to Serbia, Slovakia, Czech Republic, Estonia, Lithuania and Malta.

Table 3. Leading pharmaceutical exporting countries (in millions of EUR).

Item	Country	2005	2010	2015	2017
1	Switzerland	25,705	43,959	58,127	68,374
2	Germany	30,696	49,832	68,706	75,118
3	Italy	10,573	13,291	19,052	23,855
4	France	18,457	26,304	27,857	28,653
5	UK	18,077	25,965	33,343	29,776
6	Ireland	14,531	24,156	30,231	35,451
7	Belgium	28,164	38,864	41,003	40,294
8	Netherlands	9,548	11,990	27,434	31,729

Source: UN Comtrade and EFPIA.

intensive investment in R&D. In the former socialist countries, the transformation of the pharmaceutical industry was conducted through the transition process, and only a small number of the companies positioned themselves successfully on the market. In the SEE area, large companies such as Galenika, Zdravlje Leskovac, Alkaloid Skopje, Pliva Zagreb, Bosna Lek, Hemofarm and other, found themselves in the throes of foreign competition and faced the problems of the disintegration of the common country in which they operated. The large companies started falling apart, and only small and medium-sized companies remained in the market, but they were not able to invest in R&D.

In the year preceding the breakup of the SFRY (or Fmr Yugoslavia), the total exports of the pharmaceutical sector amounted to US\$485 million. It was a significant increase compared to 1970, when exports amounted to only US\$25.8 million with a deficit of US\$7.51 million. In 1990, exports

from the pharmaceutical sector generated a surplus in foreign trade and the sector accounted for as much as 28.9% of total exports. Having analysed the foreign trade indicators in the 20-year period, we can conclude that exports increased by US\$459 million and the deficit swang to a surplus of US\$223.9 million (Table 4). Some of the countries continued to benefit from exports of medicaments and medical products. Croatia had surplus and a positive comparative advantage of exports for a short period of time, more precisely before the start of the transition process²⁹, and later the deficit in trade became significant and the country lost the comparative advantage of exports. Further development of the pharmaceutical sector depended on the ability to acquire modern technology, investments, and development strategies. When it comes to Serbia, the unsuccessful transition and the absence of a long-term development strategy hindered the intensive development of the pharmaceutical sector. The restructuring process of the third-world pharmaceutical companies was in full compliance with the principles of good manufacturing practice, with the aim of meeting the hygiene and quality criteria by domestic laboratories, or meeting the technical criteria in order to produce, with appropriate marketing strategy, the products that would be competitive in the international market.

Finally, it can be said that, during the analysed period, the development and restructuring of the pharmaceutical sector of the SEE countries were influenced by many internal as

Table 4. Exports and imports, share of the country exports and RCA index of pharmaceutical sector of Fmr Yugoslavia in the period 1970 to 1990.

Year	Country	Exports (\$)	Imports (\$)	Share in exports (%)	RCA
1970	Fmr Yugoslavia	25,818,412	33,328,404	0.18	-0.19
1975	Fmr Yugoslavia	66,586,040	72,534,128	1.64	-0.05
1980	Fmr Yugoslavia	178,002,224	106,786,040	1.98	0.30
1985	Fmr Yugoslavia	182,020,240	99,323,512	1.71	0.53
1990	Fmr Yugoslavia	485,071,000	261,128,000	28.89	0.36
Change in 1990 comparing to 1970		+459,252,588	+227,799,596	+28.71	+0.55

Source: UN Comtrade and calculation by the authors; <https://comtrade.un.org/db/mr/rfCommoditiesList.aspx?px=H1&cc=TOTAL>.

well as global (international) factors, which resulted in different production growth rates. After many years of preparation, the transfer of production from the Western European countries to the SEE countries followed, along with the integration of foreign pharmaceutical companies and domestic factories (e.g. Hemofarm became a part of the STADA Group). The newly set goals were to ensure production under controlled, clearly defined and standardized risk-reducing procedures (all aspects of production, from raw materials, materials, space, process, equipment to personnel). However, the aforementioned trends were not sufficient to sufficiently raise the level of production and ensure a significant share in exports.

An important indicator of the competitiveness of the pharmaceutical industry of the SEE countries in international trade is the maintenance of export orientation and a foreign trade deficit (except for Slovenia). Relatively low coverage of imports by exports is present as a result of significantly higher imports than exports, as well as decline in the share of the SEE countries in the total world exports. All this speaks of insufficient export orientation and utilization of export potentials. The question is whether export oscillations are an indicator that encourages and indicates a long-term trend. However, the trend of a slight increase in exports, which has been observed in the last few years at the level of the SEE group, must be positively assessed. In addition, the sustenance of pharmaceutical industry exports in the total exports and economic activity of Southeast European countries has been observed as well.

Comparing the data of the analysed countries, we conclude that in Slovenia the pharmaceutical sector exports averaged 7.88%. Croatia followed with 3.51% (Table 5), and the share of other SEE countries ranged between 0.93 and 2.48%. With regard to other export indicators (export per capita, share of total countries export, trade balance), Slovenia has the best competitive position.

Results and discussion

The analysis of the comparative advantage levels of the pharmaceutical sector exports of Fmr Yugoslavia in the SEE countries has been performed here below. The results of the research on the presence of comparative advantage in pharmaceutical sector exports are shown in Tables 6 and 7. Previous research by Ignjatijević²⁶ on the competitiveness of the Danube region countries indicated a high share of exports of industrial products in total exports of Slovenia and Croatia and a positive comparative advantage of exports in the period 2004–2011, as well as the positive comparative

Table 5. Exports of pharmaceutical sector measured by share in country exports (%).

	B&H	CROATIA	MACEDONIA	MONTENEGRO	SERBIA	SLOVENIA	SEE
2005	0.61	1.88	2.02	1.91 (2004)		6.28	0.88
2010	0.92	3.47	2.28	2.00	2.01	9.05	1.65
2015	1.12	4.48	1.57	2.08	1.62	8.33	1.97
2018	1.25	6.16	1.51	5.39	1.43	8.19	1.85
AVERAGE	0.93	3.51	1.96	2.48	1.78	7.88	1.38

Source: UN Comtrade and calculation by the authors.

Table 6. RCA index of comparative advantage of pharmaceutical sector exports (2005–2018).

	B&H	CROATIA	MACEDONIA	MONTENEGRO	SERBIA	SLOVENIA	SEE
2005	-0.83	-0.53	-0.36	-0.48		0.69	-1.12
2010	-0.97	-0.35	-0.34	-0.42	-0.35	0.79	-0.75
2015	-0.94	-0.24	-0.49	-0.39	-0.76	0.93	-0.49
2018	-0.83	-0.13	-0.55	-0.21	-0.82	0.65	-0.55
AVERAGE	-0.90	-0.30	-0.43	-0.36	-0.64	0.84	-0.73

Source: UN Comtrade and calculation by the authors.

advantage of the Slovenian chemical sector exports in 2009²⁶, which is consistent with the conclusions Buturca⁴.

An analysis of the comparative advantage of exports of the pharmaceutical sector of the Fmr Yugoslavia shows a positive value in the period after 1980 followed by a breakup of the country and a drastic fall in exports. Analysis of the comparative advantage of exports of SEE countries, modeled on 22 and 23, showed that in the analysed period the comparative advantage of exports had an average value of RCA = -0.73. In fact, in the period 2005–2018, a negative balance was achieved in foreign trade, at the level of individually observed countries, which resulted in a decrease in the value of the RCA index in all countries except Slovenia.

The analysed period shows that an increase in the global medicine market was achieved, estimating an annual growth of 3–6%, as well as that developing markets will be key drivers of development, as indicated by Galović in his earlier research¹⁰, and MNK will play a key role in this, as indicated by Yeoh and Roth¹¹. The nominal consumption of pharmaceuticals is on the rise, as a result of an increase in consumption of medicaments for hepatitis C (US\$12.3 billion in 2014), cancer and multiple sclerosis (US\$8.9 billion in 2014) and diabetes (US\$32.2 billion in 2014). Real world consumption of pharmaceuticals per capita was US\$995 in 2014, nearly tripled compared to 1995. The increase in consumption is the result of the initiation of new products, innovative actions, the development of new technologies, employee education, as pointed out by Andrijević, Matovac¹⁸, the advent of new brands and innovations in methods of treating certain diseases. On the other hand, successful positioning in the domestic market and profitable business,

Table 7. List of products exported and imported by SEE countries – category: pharmaceutical products (in thousands of US\$).

	Medicaments consisting of mixed or unmixed products for therapeutic or prophylactic uses	Human blood; animal blood prepared for therapeutic, prophylactic or diagnostic uses	Pharmaceutical preparations	Medicaments consisting of two or more constituents mixed together for therapeutic or prophylactic uses	Wadding, gauze, bandages and the like, e.g. dressings, adhesive plasters, poultices, impregnated or covered with pharmaceutical substances	Dried glands and other organs for organo-therapeutic uses, whether or not powdered;
Exports						
2005	2,507,180	122,286	120,629	240,494	109,449	1,668
2010	8,222,740	455,758	481,395	400,445	56,538	52,732
2015	10,948,137	1,327,000	729,303	494,492	234,676	53,337
2018	11,938,298	2,790,745	962,764	75,555	306,327	44,969
Share in the total exports of the pharmaceutical sector in 2018 (%)	70.96	16.59	5.72	0.45	1.82	0.27
Imports						
2005	9,525,712	908,849	392,675	46,757	14,128	27,336
2010	18,110,117	2,426,151	609,017	125,041	213,144	251,152
2015	17,106,755	3,724,906	543,129	308,654	327,219	191,177
2018	21,511,734	6,111,780	662,619	43,129	415,904	231,424
Share in the total imports of the pharmaceutical sector in 2018 (%)	73.15	20.78	2.25	0.15	1.41	0.79

Source: UN Comtrade and calculation by the authors.

highlighted by Ji i Ye¹⁷, affect the competitive position of companies, which, thanks to increased R&D expenditures, can adapt to increasingly complex requests and changes in demand Bakic²⁰. It is estimated that by 2020 pharmaceutical consumption will be increasing by an average of 6.4% annually in North America, by about 6.1% annually in Latin America, by only 2.2% annually in Western Europe, and in Asia and Australia by 10% as a result of the development of health programs in China. Large total investments, especially in developing countries, will result in an increase of the medical technology market at a rate of 5.0% per annum by 2020, and multinationals, said by Yeoh i Roth¹¹, and SDI will in that process take a main Yu i Kopcha¹⁴.

In order to give a detailed overview of the foreign trade in the pharmaceutical sector of the SEE countries, the exports of the commodity groups (HS-4 in HS Classification), represented in the exports, were analysed. Below is the analysis of the exports in the period 2005–2018. The results of the analysis are shown in Table 7. They indicate the commodity groups that have export potential. Comparing the data about the analysed SEE countries, it can be concluded that there is significant heterogeneity in the absolute values of exports and imports of pharmaceutical products. Absolutely the largest export was achieved in the commodity group: Medicaments consisting of mixed or unmixed products for therapeutic or prophylactic uses. Their share in total pharmaceutical exports in 2018 was 70.96%, followed by a 16.59% share of Human blood; animal blood prepared for therapeutic, prophylactic or diagnostic uses. At the same time, the largest imports were achieved in the same commodity groups, only nominal values are higher and amount to 73.15% and 20.78%, respectively. Contrary to Adolfsson's²¹

view that EU membership does not significantly affect the value of exports, the result of the survey indicate a positive trend of exports of Slovenia and Croatia, which coincides with EU membership. The reasons for the positive tendencies in exports are certainly related to the functionality and successful management of the health sector, as pointed out by Čavlin, Žugić Prebiračević²³ and enhanced interaction between manufacturers and distributors, once boundaries have been opened, which is in line with the opinion of Dobbelaer, Van Leuven, Raeymaeckers²². In addition, the inherited achievements of socialist management of the health care system, such as connectivity and domination of the state in the pharmaceutical sector, have subsequently enabled successful functioning, which is in line with the view of Sudershan, Muppani, Khan and Ali²⁴. It is also the fact that in the process of joining the EU, they had to adopt and meet high production standards. Other SEE countries, on the other hand, are members of the CEFTA agreement, which facilitates their competitive position in the CEFTA market, but not in other markets. Considering that the export and production structure of the SEE countries are concentrated in several businesses, it is logical to conclude that the countries of the Region are increasingly trading with each other thanks to the existing trade links and business policies of the pharmaceutical companies, which is consistent with the conclusion of Sushmita et al.¹⁵ and Narayana et al.¹⁶

The declining export competitiveness of the pharmaceutical sector of the SEE countries is expected due to the global consolidation of capital and the multiple increase in foreign trade of the most developed countries of the world. Despite the export recovery of the pharmaceutical sector and the growing competitiveness of individual countries, the latest

developments in 2018 confirm the increasing competitive pressure in international export markets and the increase in imports.

Despite the increasing share of individual commodity groups in total pharmaceutical product exports, the latest trends in 2018 confirm a decline in export competitiveness with most export products: medicaments; wadding, gauze, bandages; sulphonamides; pro-vitamins and vitamins; hormones, prostaglandins, thromboxanes; glycosides; vegetable alkaloids; sugars (Table 7). The decline in competitiveness is the consequence of insufficient export orientation towards the demanding EU market³¹. Additionally, the reasons should be sought in insufficient interstate trade in pharmaceutical products, which, due to the proximity of the markets, similar preferences in consumption and the existence of trade links, could much more contribute to the improvement of the overall export competitiveness of the pharmaceutical sector in the SEE countries.

Conclusion

The pharmaceutical market is, on a global scale, characterized by the market concentration of several major manufacturers, with intense competitive pressure and capital consolidation, that is, the connecting of businesses. Measured by production volumes, exports and imports, investment in R&D and employment, the pharmaceutical industry in the world is recording high growth rates. In terms of production volumes and exports, the best ranking are the pharmaceutical industries of Switzerland and Germany.

The period of socialist development of the pharmaceutical industry of the common country, Fmr Yugoslavia, is characterized by the concentration and construction of new facilities, the modernization of production processes and the introduction of new technologies, the organizational and territorial changes in the structure of many enterprises and, logically, the surplus in foreign trade. In the process of preparing for accession to the EU, the restructuring and modernization of the economy, and especially of the pharmaceutical sectors of Slovenia and Croatia, was carried out, which led to a greater degree of concentration of production. After Slovenia and, a little later, Croatia joined the EU, a higher annual growth of production was recorded and later, the export growth was present. However, in the analysed period, the total exports did not increase sufficiently to be able to absorb the loss of competitiveness and the increase in imports. Although there was an increase in the share of pharmaceutical sector exports in the total exports of the SEE countries, there was a significant higher level of imports than exports. This trend is a consequence of significantly higher consumption of pharmaceutical products and preparations than production. Of the SEE countries analysed, Slovenia and Croatia have the highest share of total exports, with Slovenia having the highest export value and trade surplus. The research results show that B&H and Serbia have the lowest share of the pharmaceutical industry in the total foreign trade.

Some of the main reasons for low competitiveness are relatively small domestic markets and increasing competitive pressure. Considering the production potential of the countries and their company tradition, the goal of becoming competitive in the international market depends on their efficiency, flexibility and learning. The efficiency of the pharmaceutical sector of the SEE countries is related to the reduction of operating costs and the productivity-increasing activities of the companies. It is important to offer the products that will integrate state-of-the-art technology solutions resulting from R&D, the products that will satisfy demand, outstrip competition and generate faster productivity growth than the cost increase. However, the inflow of FDI, investment in R&D and strengthening the cooperation between science and production, were not at the level that would significantly enhance the export competitiveness of the pharmaceutical sector of the SEE group as well as the successful and proper market performance of the individual countries. The research results indicate that the companies in the leading pharmaceutical exporting countries have no problem with the efficiency of international logistics chains, that their restructuring has contributed to more efficient production and that the companies are working on the improvement of managerial competencies and education of employees.

The research on the comparative advantage of the pharmaceutical industry exports of the SEE countries as a whole, as well as of individual countries, indicates the following results: the comparative advantage of exports of the sector as a whole has been negative for many years. The total value of the exports has been multiplied many times and accompanied by a change in the value of imports, and therefore by the values of the RCA index. The question is, why have some positive changes occurred in some countries and negative trends in others, or why have the SEE countries, as a whole, lost their dominance in exports? The reasons are certainly in the sphere of inefficient transition and company restructuring. It is Serbia and B&H who show the highest negative values and the decrease in the RCA index, which is the consequence of the decrease in exports due to inadequate response to customer demands in the EU and other countries. It is this research that has pointed to the decrease in the competitiveness of the pharmaceutical sector as a consequence of slow and inefficient adaptation to market needs. This is directly related to quality management, where companies need to guarantee their customers top quality of products with quality certificates and certificates of compliance with quality standards. Improvement of management or technological knowledge should contribute to effective change management, and the responsibility lies with the companies as well as the state. The role of the state in the process of improving the competitiveness of the pharmaceutical sector covers the area of education and R&D. It also includes the responsibility for creating an environment suitable to attract FDI. Fiscal measures, an efficient legislative framework and labour market flexibility are crucial here. In addition to increasing knowledge, it is extremely important to relax macroeconomic conditions and make the chaotic

and unpredictable business environment attractive to investors.

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Article

Analysis of the Professional Aspects of Medical Drugs Industry in the Republic of Serbia in Times of COVID-19 Pandemic

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Abstract: The research subject of this paper is the analysis of the attitudes of employees in pharmaceutical companies towards the business aspects of the pharmaceutical industry during and after the end of the pandemic in the Republic of Serbia. The aim is to examine the differences in the attitudes of employees, as well as to determine which variables predict the situations of endangering the professional reputation of pharmaceutical companies during the COVID-19 pandemic. The research was conducted by means of a survey during 2021 on a sample of 27 innovative and generic pharmaceutical companies. We used the SPSS program for descriptive statistics analysis, chi square test and binary logistic regression models. The findings show that there is a statistically significant difference in the expressed attitudes of employees in innovative and generic pharmaceutical companies in terms of coming to the office during the pandemic; the lack of medicines and medical devices used in the treatment of COVID-19 infections; the patient access to a chosen doctor; the expectations of the employees to continue working from home after the outbreak of the COVID-19 pandemic. The findings of the binary regression models show the slowdown in the supply chain, the access to doctors and working from the home office have not been perceived as creating situations of endangering professional reputations, that is, they contribute to the sustainable economic success. On the other hand, the introduction of digital technologies decreases the occurrence of conditions in which their professional reputation has been threatened.

Keywords: pandemic COVID-19; pharmaceutical companies; business aspects; professional reputation; sustainable economic success; Republic of Serbia



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1. Introduction

The global pandemic has affected many fields of economic and social behavior [1–3]. Global and national regulators have adopted measures to eliminate the effects of COVID-19, aimed at preserving human health, but also the financial health of the economy. The problems faced by pharmaceutical companies during the pandemic encompass the segment of management and the definition of new strategies regarding the medical treatments; research and development activities; balancing the drug supply chain; employment changes; pharmacy practice changes and pharmacists [4]. The COVID-19 pandemic in the pharmaceutical sector has contributed on the one hand to increased turnover and revenue [5,6], and on the other hand to reduced employment [7–9]. Changes in the pharmaceutical sector competitiveness [10], the changes in demand as well as shortages and supply disruptions [11], stockpiling, changes in employment [9], regulations and types of employment [12,13], the introduction of ICT technologies in the early diagnosis and detection of COVID-19 [14], communication with patients and healthcare professionals have been identified as important research subjects in the current literature. Accordingly, Elsheikh et al. [15] indicate that artificial intelligence should help researchers, experts and policy makers to develop more accurate prediction models and improved strategies to control the spread of this pandemic, to enable sustainable economic success.

In the European Union, the healthcare industries provided more than 7 million jobs in 2018 and the pharmaceutical industry accounted for about EUR 213 billion in market

value in 2019 with the medical technology sector (which was worth EUR 120 billion in 2018). The pharmaceuticals sector hit by the pandemic only during the early stages of the pandemic, while the pharmaceutical and digital sectors have been the least impacted sectors, with the recovery commenced during 2020. In the first wave of COVID 19 pandemic the demand for related medical treatments and equipment dropped. Self-medication (SM) gained importance and suggestions for (SM) came from friends, family, neighbours, pharmacists, media, etc. [16,17] and it involved the purchase of some supplements and herbal preparations [18]. However, the WHO then issued several cautionary warnings regarding SM for the treatment of COVID-19, including the irrational use of antibiotics, herbal medicines, and other drugs [19]. SM definitely helped to reduce the burden on the health system, state agencies, third parties [20] and helped to overcome the problems of the first wave of lack of medicines, supplements, disinfectants and protective agents and non-availability of doctors and health institutions in Serbia. That is why health policies have promoted laws and policies in favour of the use of prescribed drugs, but also improving public awareness and education about the safe and rational use of prescribed drugs. All this has affected on the generic pharmaceuticals sector which caused inconsistencies in the demand-supply ratio and new services such as e-Health and AI, which already started to develop before the pandemic, were continued to be implemented also through the pandemic [21]. In the Republic of Serbia the most significant share in the formation of GDP in 2020 has had the manufacturing sector, encompassing also the pharmaceutical manufacturing, which accounted for 13.7% of GDP in 2019 and 13.3% in 2020, while its real growth rate in the same year was 0.2%. The revenue of RSD 730,413 million was generated in this sector, which is a slight decrease compared to the revenue from 2019, when it had totaled RSD 741,815 million [22]. The outbreak of the pandemic has focused demand on the products of the pharmaceutical industry, while the production of basic pharmaceutical products has increased in 2021 [23].

On the other hand, the pharmaceutical sector has shown certain business specifics [24], which differ from country to country [3]. Watson et al. [4] (2021, p. 13) outline that “the prolonged nature and demands of COVID-19 has been the catalyst to the new equilibrium of pharmacy practice change and pharmacists’ professional role identity”. During the COVID-19 pandemic, the majority of the pharmacists were engaged with the pharmaceutical industry with a growing number now employed in the community pharmacies or at retail pharmacies [25]. The findings show, that during the COVID-19 pandemic, pharmacists participated in health education and promotion, medication dispensing, medication reconciliation, medication and patient counselling, training for self-management, and emergency preparedness [26]. Ayati et al. [24] indicate that in previous recessions, the pharmaceutical industry has shown less sensitivity, which indicates a high degree of vitality of the pharmaceutical sector and the ability to achieve long-term sustainable economic success. Florio and Gamba [27] emphasize the need to identify research priorities in the public health sector, with a focus on developing preventive and therapeutic strategies against those diseases that will pose the greatest threat to human and social well-being in the coming decades. In the post-COVID-19 time, countries need to strive to move towards greater political coordination, crisis management, and crisis communications [28]. COVID-19 could also create an opportunity for leadership across groups such as families, workplaces, local communities, and nations [29].

The findings of the authors of [30] about the attitudes of pharmacy professionals in Africa, Asia, the Americas, Europe, and the Pacific point to personal concerns regarding the spread of the COVID-19 infection, business problems due to isolation, quarantine, and difficulties in physical communication with colleagues. The authors point out that until the outbreak of the pandemic, pharmacy professionals did not have the opportunity to work remotely or only sporadically. After the outbreak of the pandemic, they were simply forced to find a solution, which gave remote work a new dimension. On the other hand, respondents who work in academia, professional bodies and industry were more likely to work remotely compared to those in government and patient-facing roles

such as community and hospital [30]. The pandemic has also caused the separation by professionals of work and non-work lives related to conforming to a set physical location for client interactions that includes office from home [12]. The recognition of workplace-specific infection risks, provision of reliable personal protective equipment, redesign of work practices, discouragement of presenteeism, and improved access to sick leave have been vital in the crisis [31]. Many papers have researched the risks for sustainable economic success, the economic and health care impacts during the times of the COVID-19 in the medical sector [7–9,32,33]. In their comprehensive review on the concept of underemployment, the findings show that the effects of underemployment are similar to those of unemployment [7]. Considerable short and long-term implications of the pandemic have been stressed in regard to informal employment and the informal economy [9], as the findings of the preliminary forecast of the regional employment effects of COVID-19 across Chilean regions have estimated the loss in the average scenario was around 705,000 jobs [8].

As the global pandemics have affected all business segments, a logical question arises as to the overall impact on the sustainable economic success and professional reputation of the pharmaceutical companies. Manabe and Nakagawa [34] have pointed out that the companies with high brand reputations were more susceptible to the coronavirus shock, while the companies with a strong reputation for product/service usefulness had greater resilience to the shock. Pollak et al. [35] point out that the effects of a pandemic on the reputation of healthcare providers have shown that while the traditional level of reputation of the entities reflected changes in the market only to a limited extent, the level of the online reputation has decreased significantly due to the pandemic. The findings relating to company reputation in the Republic of Serbia [36] have shown that companies can particularly assume their responsibilities by contributing to the improvement in the consumer's lifestyle [37]. The findings on the mediating role of patient satisfaction in the effect of corporate reputation on patient loyalty have shown that corporate reputation positively affects patient loyalty, and patient satisfaction plays a positive increasing role in this effect [38]. Research shows that public perception was influenced by the empathy of the brand and the company behavior before the COVID-19 period [39]. The study of Dwiedienawati et al. [40] confirms that the transformational leader, the crisis management team, the quality of communication, and the frugal innovation type positively influenced the sustainable economic success and effectiveness of crisis management which led to corporate reputation.

Due to the fact that the business activities of the pharmaceutical industry have a strong impact on drug supply and the health system as a whole [41,42], the current study should contribute to the relevant literature of the pharmaceutical industry of the Republic of Serbia, in order to identify specific challenges for business reputation and sustainable economic success and actions in the country in times of the COVID-19 pandemic. According to Jovanović et al. [43], the law defines the provisions for the protection of intellectual property, especially for the patent protection regarding medicines. The pharmaceutical companies can be divided into two groups based on the ownership of patents for the original drugs. Innovative companies have a patent that was developed on the basis of a new substance, that is, they are manufacturers of original drugs. Generic companies produce drugs for which the basic patent protection has expired. In recent times, the generic industry is increasingly innovative because it produces drugs with new technologies, with the use of new materials. This research should fill this gap, i.e., explain the importance of knowing the impact of the pandemic on the operations of companies in the pharmaceutical sector, i.e., knowing the factors and their predictive impact on jeopardizing business reputation and sustainable economic success. Since the respondents have different attitudes, the research aims to examine the conditioning and the degree of influence and significance of these differences on attitudes about the existence of risk to business reputation. Therefore, the attitudes of employees in pharmaceutical companies should be experienced as guidelines for increasing the company's reputation. The study contributes to the improvement of knowledge of the

role of the attitudes of employees in pharmaceutical companies on business reputation, performance and competitive advantage in Serbia. Finally, the study should offer pharmaceutical company managers and practitioners' knowledge and information that will be useful to them in similar risky situations in order to increase business performance and sustainable economic success.

Therefore, the first specific objective of this research were to examine the differences in attitudes between employees in innovative and generic companies in the pharmaceutical sector on the specifics of conducting business during the COVID-19 pandemic. The second specific objective has been to determine which independent variables predict the situations of endangering of the professional reputation of pharmaceutical companies during the COVID 19 pandemic.

After the introductory part, the authors present the literature review on the impact of the pandemic on the business of the pharmaceutical industry. The methodological framework focuses on the goal of the research and the research methods used, followed by the research findings and their discussion. In conclusion, the authors summarize the findings, present the limitations of the research, and make policy recommendations.

2. Method

The research examined the attitudes of the representatives of the Serbian pharmaceutical companies on the specifics of the pharmaceutical business during the COVID-19 pandemic. The questionnaire that has been used in the research has been developed on the basis of previous studies conducted by the Organization for Economic Cooperation and Development [44]. For the purposes of the research, the questionnaire was adjusted to the needs of the survey and the situation in the Republic of Serbia. The specifics of business of pharmaceutical companies and attitudes of companies have been adapted from published papers modelled on the research of Ayati et al. [24] and Rockers et al. [41]. Initially, pre-validation was performed on an appropriate sample (10% of the total population of legal entities that participated in the survey). In this phase of validation, the respondents performed a review and content validity of the questionnaire.

The final version was sent to all pharmaceutical companies, legal entities operating in the territory of the Republic of Serbia, and are located within the following associations: INOVIA (representative office or representative office of a company of innovative drug manufacturers), GENESIS (representative office or representative office of a generic drug company) and Chamber of Serbia (domestic manufacturers of generic drugs). This includes a total of 53 legal entities, while the full responses have been received from 27 companies. Associations of drug manufacturers (INOVIA and GENEZIS) and the Chamber of Commerce possess all information about members (contacts and emails). After taking over the official contact of a particular company, a telephone conversation was held to make sure that we are sending the survey link to the right address (manager and employee). The survey was created in the Google application and the questionnaire link was sent by email. The research was conducted during October 2021. In the text of the email, an explanation of the goal of the research was provided and an explanation was given that the project is being carried out for scientific research purposes and that all information and data that will be collected during the research are strictly confidential and in accordance with the General Data Protection Regulation. Due to the sensitivity of the data and the protection of the identity of the respondents. All answers were treated as anonymous and the obtained data were processed at the group level. The questions were divided into units and where we felt it was necessary there was a clarification. The questionnaire consists questions divided into 5 parts: (1) general data and characteristics of the company—type and size of business entity (2) economic parameters of business during the pandemic—change in structure and income of business entity due to pandemic (3) specificity of pharmaceutical business in time of the pandemic—activities of the business entity, professional reputation, ethics and corporate culture (4) attitudes towards the availability of medicines and health

care (5) attitudes towards the business of the pharmaceutical industry after the end of the pandemic.

Questions 1—The questions in the first and second groups were in the form of multiple choice answers, the questions in the third group had the possibility of answering yes and no, while the questions in the fourth and fifth groups were presented in the form of a scale. The questionnaire included questions and claims on the impact of the pandemic on the following aspects of pharmaceutical companies in the Republic of Serbia: company structure (number of employees, changes in the number of employees, type of work environment), financial aspects, business activities (common and specific as part of the pandemic response in the drug supply chain, introduction of new health technologies, digitalization, change in the company's portfolio, impact of the pandemic on business responsibility, ethics and corporate culture, conflict of personal interests of the responsible person and the interests of the company, etc.), and availability of the health system during the pandemic (patient access to a selected doctor—consultant services, patients' access to necessary medicines, the state of the drug donation program in the COVID-19 pandemic). We presented the research using a workflow:

- Step 1. Defining the problem and research objective—a literature review was conducted to verify research models and key variables to be included in the research.
- Step 2. Defining the statement and designing the survey; initial items were pre-tested.
- Step 3. Collect the data and generate the final set of variables.
- Step 4. Statistical analysis—the collected data were tested for reliability and dimensionality (Cronbach's alpha). Some suggestions were made about items to exclude/include and the scale was adapted.
- Step 5. Prepare the final scale and the data were collected, the final sample was obtained.
- Step 6. Final statistical analysis (Chi square and binary logistic regression).
- Step 7. Discussion and interpretation of results.

Data processing was performed using the SPSS program for statistical data processing. Descriptive statistics, the Chi square test, and binary logistic regression models were used to analyze the phenomena in detail.

As part of the descriptive statistical data processing, the mean value and the percentage share of individual answers in the total sample were calculated. Thus, the arithmetic mean represents an average value in order to express certain average characteristics of a population or sample. The arithmetic mean of a set of quantitative data is the sum of all values divided by the total number of objects of which the data set consists [45]:

$$\bar{X} = \frac{\sum_{i=1}^n X_i}{n}$$

The Chi square test was employed to analyze the results of the differences in attitudes between employees in innovative and generic pharmaceutical companies on the specifics of conducting business during the COVID-19 pandemic [46]. The Chi square test— X^2 —is used by examining whether the obtained distribution deviates from the expected distribution, whether the characteristics of our sample deviated from the distribution in the population by some variable. The Chi square test calculates the extent to which the observed distribution of values deviates from the theoretical distribution [47]:

$$X^2 = \sum_{i=1}^k \frac{(O_i - E_i)^2}{E_i}$$

Binary logistic regression is used to predict categorical outcomes with two or more categories and is used to investigate the predictive power of sets or blocks of variables and allows specifying the way variables are entered [48]. By conducting binary logistic regression, the authors have tried to analyze the influence of independent variables which predict the attitudes pharmaceutical companies on working conditions that could endanger their professional reputation and sustainable economic success during the COVID-19

pandemic [49,50]. The dependent variable is “During the Covid19 pandemic, were you in situations where you worked in conditions that threatened your professional reputation”, while the independent variables are from the categories: specificity of the pharmaceutical business during the pandemic; attitudes about the availability of medicines and healthcare; and attitudes according to the operations of the pharmaceutical industry after the end of the pandemic. The variables were not directly and immediately included in the model, which could lead to an underestimation of their influence, but they were successively included in the model and tested in order to find the optimal solution, that is, to build a model for predicting professional reputation. Therefore, binary logistic regression was performed in 3 steps using the Forward Stepwise (Likelihood Ratio) method.

3. Results and Discussion

The survey results show that 48.1% of respondents were directors in the companies, while 51.9% of respondents were in other lower positions. The survey covered 59.3% of innovative companies and 40.7% of generic companies (domestic and foreign) (Table 1).

Table 1. General data, characteristics of the company, and economic parameters of business during the pandemic.

General Data and Characteristics of the Company		Percent
Which group does your company belong to?	Innovative *	59.3
	Generic **	40.7
How many employees does your company have in Serbia (at the time of completing the questionnaire)?	less than 25 employees	37.0
	more than 25 employees	63.0
What was the income of your company in Serbia in the year before the COVID-19 pandemic?	up to EUR 8 million	55.6
	more than EUR 8 million	44.4
Economic parameters of business during the pandemic		
What is the percentage of employees in your company in Serbia who, due to the pandemic, did not come to office either due to impossibility or due to non-obligation?	up to 20%	55.6
	more than 20%	44.4
Did your company encounter financial difficulties during the previous period, and after the outbreak of the COVID-19 pandemic?	no financial difficulties	81.5
	suppliers debt	7.4
	salaries debt	11.1
Did your company encounter problems during the COVID-19 pandemic?	no problems	18.5
	logistical problems	48.1
	Other	33.3
What was the total income of your company in Serbia in 2020 compared to 2019?	the same	7.4
	increased up to 10%	33.3
	increased over 10%	33.3
	decreased up to and more than 10%	14.8
	I do not know	11.1
What were the total costs of your company in Serbia in 2020 compared to 2019?	the same	22.2
	increased up and more than 10%	37.0
	decreased up to and more than 10%	33.3
	I do not know	7.4

* Innovative companies have a patent that was developed on the basis of a new substance, that is, they are manufacturers of original drugs. ** Generic companies produce drugs for which the basic patent protection has expired.

The sample includes 63% of pharmaceutical companies with more than 25 employees. The survey showed that 55.6% of companies had revenues of less than EUR 8 million in 2019, i.e., before the pandemic, and that 55.6% of companies had up to 20% of workers who did not come to the office either because it was impossible, or they were not obligated to come. An important fact is that as many as 81.5% of companies did not have financial

difficulties in the period after the declaration of the pandemic in the country, and that 66.6% of companies had an increase in revenue in 2020 to 10% and more than 10%. Of the companies analyzed, 37% had a cost increase of up to 10% and a 33.3% cost reduction of up to 10%, which is in line with the conclusions [5,6,51] on the impact of the pandemic on the business of pharmaceutical companies (Table 1).

The analysis of the business specifics of pharmaceutical companies during the pandemic (Figure 1) shows that 96.3% of respondents were of the opinion that during the economic activity there were situations that would jeopardize professional reputation and that personal interests were in conflict with the company's interests. In addition, 92.6% of respondents expressed problems with investing in R&D, which is in line with the study of Robinson [52].

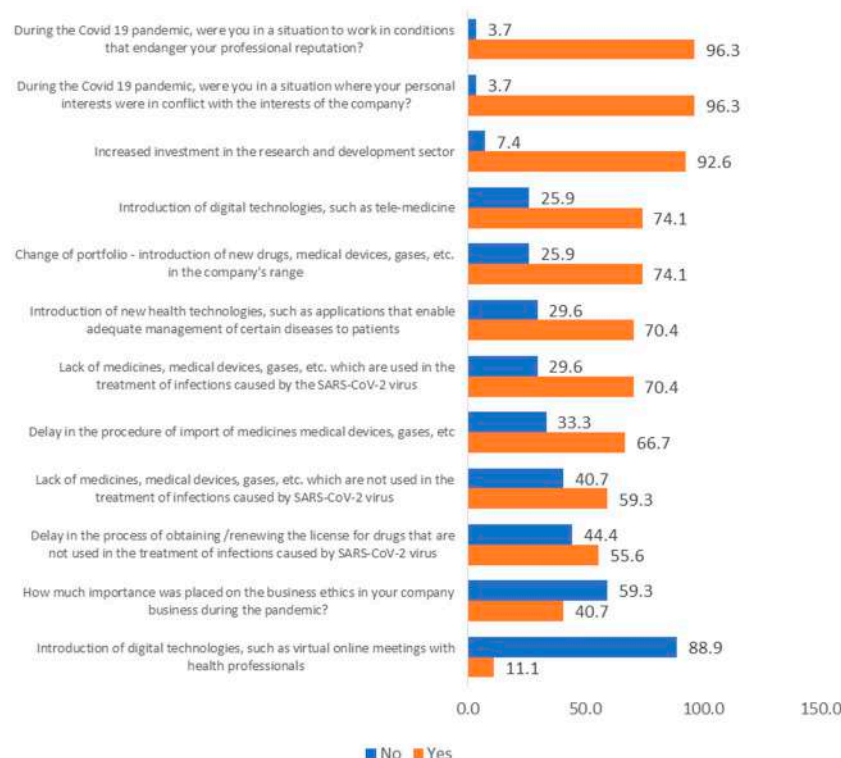


Figure 1. Specificity of pharmaceutical business during the pandemic (in %).

The attitudes towards the availability of medicines and health care research was also conducted on a sample of pharmaceutical companies, due to the fact that in the Serbian health system they are in direct communication with the state health institutions and the private sector, as well as with pharmacy institutions. In that position, they have data on the needs of the system, i.e., whether there has been a reduction in ordering and in which categories of drugs there has been a change in consumption (and the change is a direct consequence of the impossibility or difficulty in prescribing and issuing certain prescription drugs).

The findings show that during the pandemic there was a problem with access to medicines and doctors. Non-COVID-19 patients were particularly affected, e.g., the pandemic caused major shocks, which is in line with the conclusions of Stevanović [53], Watson et al. [4] and Auyeung et al. [54]. It is possible to conclude that during the pandemic many hospitals were forced to close their doors, leaving patients without therapy for an indefinite time, and doctors under increased stress and with “burnout” syndrome. A similar situation happened in developed and underdeveloped countries, which resulted in patient frustration and to threats and physical attacks on health workers [55]. The findings further indicate that the introduction of new drugs or treatments was significantly more difficult and slowed down, which is in line with the conclusions of Clark et al. [56].

The authors point out that at the beginning of the pandemic, there was a decrease in the start of systemic treatments, i.e., anti-cancer treatments in England. The availability of non-COVID-19 drugs was compromised [11,21], further complicating the treatment of chronically sick patients [57–60]. The situation later changed, which was influenced by factors to reduce clinical and social risk (such as telephone consultations, face masks, and physical distancing). Unfortunately, in the Republic of Serbia, the problem of introducing new procedures and drugs was taking more time, due to the fact that the introduction of digital technologies, such as tele-meetings with health professionals, was either slow or completely absent (Figure 2).

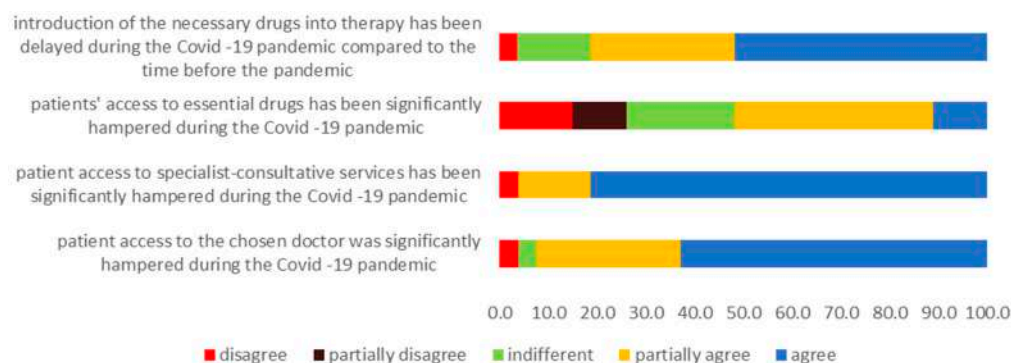


Figure 2. Attitudes towards the availability of medicines and health care (in %).

The majority of respondents are of the opinion that the drug donation program was not altered during the pandemic (44.4%) and that the number of employees after the end of the pandemic (51.9%) would remain the same. On the other hand, the findings show that the pandemic did not have a significant impact on the revenues of pharmaceutical companies, which is in line with Sandoval et al. [51]. The survey results show that a third of workers have returned to work (33.3%), with a significant percentage of respondents (29.6%) who believe that 10–50% of workers will continue working from home (Table 2).

Table 2. Attitudes towards the business of the pharmaceutical industry after the end of the pandemic.

Statement	Respondents' Answers	Percent
In your opinion, has the drug-free donation program been altered due to the COVID-19 pandemic?	its volume has been the same	44.4%
	its volume has been increased/compared to time before the pandemic	14.8%
	its volume has been reduced/compared to time before the pandemic	14.8%
	we do not have a donation program	25.9%
In your opinion, will the number of employees in the company in Serbia change after the end of the pandemic is announced?	it will remain the same	51.9%
	it will be enlarged	29.6%
	I do not know	18.5%
In your opinion, do you expect some employees to continue working from home office?	everyone is coming back to the office	33.3%
	less than 10% are working from home office	22.2%
	10% to 50% are working from home office	29.6%
	I do not know	14.8%

The Chi-Square test of the differences between the groups was further performed for five groups of questions and only those that were statistically significant were presented (Table 3).

Table 3. The Chi-Square test of the differences between the groups (innovative * and generic **).

		What is the percentage of employees in your company in Serbia who, due to the pandemic, did not come to the office either due to impossibility or due to non-obligation?				
Which group does your company belong to?	Up to 20%		More than 20%		I do not know	
Innovative	37.5%		56.3%		6.3%	
Generic	81.8%		18.2%		0.0%	
Chi2 = 5.31; <i>p</i> = 0.049;						
		Lack of medicines, medical devices, gases, etc., which are not used in the treatment of SARS-CoV-2 virus infections;				
Which group does your company belong to?	No		Yes			
Innovative	18.8%		81.3%			
Generic	72.7%		27.3%			
Chi2 = 7.867; <i>p</i> = 0.005;						
		Patient access to the chosen physician has been significantly hampered in a COVID-19 pandemic.				
Which group does your company belong to?	Disagree	Indifferent		Partially agree	Fully agree	
Innovative	0.0%	6.3%		50.0%	43.8%	
Generic	9.1%	0.0%		0.0%	90.9%	
Chi2 = 9.945; <i>p</i> = 0.019						
		In your opinion, do you expect some employees to continue working from home?				
Which group does your company belong to?	Everyone is coming back to the office	Less than 10% are working from home		10% to 50% are working from home	I do not know	
Innovative	25.0%	6.3%		50.0%	18.8%	
Generic	45.5%	45.5%		0.0%	9.1%	
Chi2 = 11.237; <i>p</i> = 0.011						
		In your opinion, you expect your company's revenue after the end of the pandemic to be?				
Which group does your company belong to?	No change	Growth up to 10%	Growth more than 10%		Drop up to 10%	I can't estimate
Innovative	12.5%	31.3%	50.0%		0.0%	6.3%
Generic	9.1%	27.3%	9.1%		36.4%	18.2%
Chi2 = 10.029; <i>p</i> = 0.040.						

* Innovative companies have a patent that was developed on the basis of a new substance, that is, they are manufacturers of original drugs. ** Generic companies produce drugs for which the basic patent protection has expired.

The Chi-Square test showed a significant difference between innovative and generic companies (Table 3). In the analyzed sample, the majority of companies (56.3%) were faced with a situation where more than 20% of employees did not come to the office during the COVID-19 pandemic. More than 81% of innovative companies did have problems with shortages of drugs, medical devices, gases, etc., which were not used in the treatment of infections caused by SARS-CoV-19 virus, while as many as 72.7% of respondents from generic companies had the opposite opinion. A very high percentage of respondents

from innovative (93.8% partially and completely agree) and generic (90.9%) companies expressed the opinion that the access of patients to their chosen doctor has been more difficult in the COVID-19 pandemic. A significant percentage of innovative companies (81.3%) believed that revenue after the pandemic would grow to over 10%. In the sample of generic companies, 36.4% of companies expected a 10% drop in revenue. The result of the following analysis indicates that 50% of respondents from innovative companies believe that 10–50% of workers would continue to work from home and 90.1% of respondents from generic companies believed that workers are returning to the office or up to 10% of employees would continue to work from home.

The questions investigated and presented in Tables 2 and 3 relate to the evaluation of pharmaceutical companies' operations after the pandemic, as opposed to the actual performance indicators in the period after a certain time. It would be significant if we were able to provide those answers as well, and compare the obtained results, which actually represents a limitation of the existing study, but also a direction for further research.

Binary Logistic Regression Models

Binary logistic regression was conducted with the aim of determining which independent variables predict the attitudes of pharmaceutical companies on working conditions that affect their professional reputation during the COVID-19 pandemic. In the regression dependent variable is "During the Covid19 pandemic, were you in a situations to work in conditions that endanger your professional reputation", and the authors tried to measure the predictive impact of all variables from the categories: specificity of pharmaceutical business in time of the pandemic, attitudes towards the availability of medicines and health care, and attitudes towards the business of the pharmaceutical industry after the end of the pandemics.

In Model 1, two of the predictive variables in the group of "Specificity of pharmaceutical business in the time of the pandemic" have been retained. Model 1 is statistically significant $\text{Chi}^2 = 22.144$; $p = 0.000$. The model as a whole explains the 18.5% Cox and Snell R Square and 25% Nagelkerke R Square variants of the dependent variable, i.e., of conditions of endangering professional reputation and accurately classifies 77.8% of cases. As shown in Table 4, only two variables made a statistically significant contribution to the model (Lack of medicines, medical devices, gases, etc., used in the treatment of infections caused by SARS-CoV-2 virus and Introduction of digital technologies, such as tele-medicine). The extended Model 2 has four variables and is statistically significant $\text{Chi}^2 = 37.411$; $p = 0.000$. The model as a whole explains the 29.3% Cox and Snell R Square and 39.5% Nagelkerke R Square variants of the conditions of endangering professional reputation and accurately classifies 74.1% of cases. As we have shown, the variable Lack of medicines, medical devices, gases, etc., used in the treatment of SARS-CoV-2 virus infections made a statistically significant contribution to the model and has a more significant predictor effect than Model 1. Finally, the expanded Model 3 has six variables of which five are statistically significant. Model 3 is statistically significant $\text{Chi}^2 = 55.701$; $p = 0.000$. The model as a whole explains 40.3% of the Cox and Snell R Square and 54.4% of the Nagelkerke R Square variants of the condition of endangering professional reputation and accurately classifies 88.9% of cases.

The research findings on the contribution of variables in the model show that the predictors: work from home office; a slowdown in the process of obtaining import licenses; changes in the drug donation program; lack of medicines, medical devices, gases: difficulties in patients accessing a chosen physician; and introduction of digital technologies, such as tele-medicine, showed statistical significance.

Table 4. The findings of binary logistic regression models.

Block 1: Method = Forward Stepwise (Likelihood Ratio)				Block 2: Method = Forward Stepwise (Likelihood Ratio)				Block 3: Method = Forward Stepwise (Likelihood Ratio)			
	B	Sig	Exp(B)		B	Sig	Exp(B)		B	Sig	Exp(B)
Lack of medicines, medical devices, gases, etc. which are not used in the treatment of SARS-CoV-2 virus infections	−1.502	0.003	0.223	Lack of medicines, medical devices, gases, etc., which are not used in the treatment of SARS-CoV-2 virus infections	−1.072	0.045	0.342	Lack of medicines, medical devices, gases, etc., which are not used in the treatment of SARS-CoV-2 virus infections	−0.943	0.095	0.389
Introduction of digital technologies, such as tele-medicine	−1.715	0.000	0.180	Introduction of digital technologies, such as tele-medicine	−1.777	0.001	0.169	Introduction of digital technologies, such as tele-medicine	−2.779	0.000	0.062
Constant	0.644	0.036	1.905	Patient access to the chosen physician has been significantly hampered in pandemic	−0.902	0.049	0.406	Patient access to the chosen physician has been significantly hampered in pandemic	−2.276	0.006	0.103
Predicted (Overall Percentage) = 77.8 Chi-square (df) Sig. = 22.144 (2) 0.000; −2 Log likelihood = 123.851; Cox and Snell R Square = 0.185; Nagelkerke R Square = 0.250.				The drug-free donation program has been altered due to the COVID-19 pandemic.	−0.547	0.009	0.579	The drug-free donation program has been altered due to the COVID-19 pandemic	−0.645	0.010	0.525
				Constant	4.989	0.006	146.86	A part of the employees will continue to work from home.	−0.028	0.011	0.972
				Predicted (Overall Percentage) = 74.1; Chi-square (df) Sig. = 37.411 (4) 0.000; −2 Log likelihood = 108.583; Cox and Snell R Square = 0.293; Nagelkerke R Square = 0.395.				Slowdown in the process of obtaining import licenses	−0.084	0.056	0.920
					Constant	11.392	0.002	8626.8			
					Predicted (Overall Percentage) = 88.9; Chi-square (df) Sig. = 55.701 (6) 0.000; −2 Log likelihood = 90.293; Cox and Snell R Square = 0.403; Nagelkerke R Square = 0.544.						

The odds of answering “yes” contributes to the perceived condition of endangering professional reputation, compared to “no”, are lower 0.972 times in terms of each unit increase in the predictor variable “A part of the employees will continue to work from home” on the scale (they all return to office, less than 10% will continue to work from home, 10–25% will continue to work from home, etc.), while the other predictors in the model remain constant. The findings show that the culture of working from home in the COVID-19 pandemic has been accentuated, as the intensity of the crisis has risen, and the performance of employees has been measured in quantum of output and work completion rather than time or days at the workplace [13]. The findings are in line with Ashiru-Oredope et al. [30] outlining that pharmacy professionals working in academia, professional bodies, and industry were more likely to work remotely compared to those in government and patient-facing roles such as in the community and hospitals. The crises calls upon organizations to question their organizational commitment and manner of conducting business as “it seems likely that the greater the perceived hardship borne by an organization to voluntarily protect its employees and other stakeholders, the greater the boost in identification” (p. 1765) [61], while the moral obligation for companies is to proactively and responsibly manage the crisis without endangering professional reputation and sustainable economic success [62,63].

The odds of answering “yes” contributes to perceived conditions of endangering professional reputation, compared to “no”, are lower 0.920 times in a situation when the slowing down of the process of obtaining permits to import drugs, “increases” (i.e., answer yes instead of no) and other predictors in the model remain constant. The findings are in line with the consequences of the pharmaceutical market pandemic that have been also reflected in delays in registration procedures and the slowdown in drug licensing [24], slowdown in growth of the industry due to the introduction of new, innovative drugs, given the changing priorities in the portfolio of pharmaceutical companies. In Paraguay, there were several decrees aiming to facilitate international trade in medical supplies, both to incentivize imports and to disincentive exports with a temporary reduction or, temporary total suspension, in value added taxes (VAT) on certain imported personal protective equipment and pharmaceutical products [64].

The odds of answering “yes” contributes to the perceived conditions of endangering professional reputation, compared to “no”, are lower 0.525 times in a situation when the altered drug donation program of each unit increases and other predictors in the model remain constant. The findings confirm the logistical problems, particularly supply chain disruption and product wastage, due to COVID-19 that were often found in the literature as most sectors experienced the shutdown of suppliers or the sudden imbalance between supply and demand for certain products [65]. The emergence of induced demand, which leads to shortages, is a consequence of the COVID-19 pandemic, but also shortages due to disruptions in the supply chain.

The value of the exponential coefficient of the predictor variable “difficult access to a doctor during a pandemic”, shows that the odds of answering “yes” (contributes to perceived conditions of endangering of the professional reputation) in relation to the answer “no”, are lower 0.103 times in terms of each unit increase on the scale of the predictor variable “difficult access to the doctor” (from “I don’t agree at all” to “I partially disagree”, etc.) while the other predictors in the model remain constant. The findings indicate that the difficulty in accessing doctors is therefore less likely to influence the situation of endangering the professional reputation and sustainable economic success of pharmaceutical companies.

The process of introducing digital technologies, such as tele-medicine, i.e., problems with the application of digital technologies, has a significant contribution. The odds of answering “yes” (contributes to perceived conditions of endangering professional reputation and sustainable economic success), compared to “no”, are lower 0.062 times in a situation when the introduction of digital technologies, such as tele-medicine, “increases of 1” (i.e., answer yes instead of no) and other predictors in the model remain constant. Therefore, the introduction of digital technologies reduces the occurrence of conditions

where the professional reputation has been endangered. The findings are in line with Webster [66] stating that high-income or upper-middle-income countries were able to quickly provide online health care and users embraced the technology, therefore a slowdown in the process of introduction of digital technologies is perceived to decrease the situations of endangering professional reputation and sustainable economic success.

4. Conclusions

Looking at the situation from the aspect of the global economy, the 21st century is a period of a significant increase in investment in the pharmaceutical industry sector. The modern pharmaceutical industry, with a high degree of flexibility, adapts its production to changes in demand in the market of pharmaceutical products, while satisfying the interests of the manufacturers and the consumers. The COVID-19 pandemic has affected the world economy, including the pharmaceutical sector. Although there is currently no definitive treatment for the new infectious disease, the pharmaceutical industry is helping governments respond to the need to prevent the COVID-19 disease, encompassing research and development actions on potential treatment strategies and balancing the drug supply chain, striving to maintain the supply of other drugs on the market.

From the findings, it is clear that most of the surveyed companies did not have financial difficulties in the period after the declaration of the pandemic in the country, and had an increase in revenue, as if during their everyday business activity there were situations that would jeopardize professional reputation and sustainable economic success and that there were problems with investing in R&D, access to medicines, and the introduction of new drugs or treatments. The regression findings show that the slowdown in obtaining import licenses and difficulty in accessing a doctor have lesser odds to indicate the occurrence of the event of endangering professional reputation and sustainable economic success of pharmaceutical companies. In addition, the altered level of the drug-free donation program and the higher percentage of employees that will continue to work from home show they are less likely to indicate the endangering of professional reputation. The introduction of digital technologies is more likely to reduce situations where professional reputation is endangered.

In that regard, employers should aim to create adequate mechanisms for working in crisis situations, such as COVID-19 pandemic conditions, taking into account the specifics of the pharmaceutical jobs. By analyzing the pharmaceutical industry in relation to the current market trends, the expected results in the context of social contribution are reflected in the prediction of the impact of future trends of the observed indicators in the conducted research. In this way, a set of concrete measures can be presented that will affect the improvement in the macroeconomic environment, and the possibility of economic growth in the observed region and overcoming the recession, despite the limiting factors of the current pandemic. This research can enable the assessment of the adaptive response of pharmaceutical companies in the conditions of the COVID-19 pandemic. In addition, the findings clearly show the differences between certain categories of pharmaceutical companies and their activities during the COVID-19 pandemic, the effects of the pandemic on the professional reputation and sustainable economic success of pharmaceutical companies, and give insight into the availability of health care in terms of patient access to the chosen doctor, specialist-consultative services, and especially access to necessary medicines to a broader audience.

A survey of pharmaceutical companies conducted after the first wave of the pandemic has given us the responses regarding the problems they faced during the pandemic. On the other hand, the respondents then expressed an assessment of the business that should follow immediately after the end of the pandemic. However, the end of the pandemic has not been declared in Serbia, and the question arises as to how far-reaching the assessment is. That is, it is difficult to determine the moment when it is possible and when it is necessary to repeat the research and establish the real situation, that is, the characteristics of the pharmaceutical companies' operations. So, on the one hand, we have an assessment of

the future, and on the other hand, we have the fact that more than 2 years have passed since the declaration of the pandemic. We think that this limitation should be overcome by organizing the next piece of research that would provide a larger number of respondents and that would enable the comparison of ratings during and after the pandemic.

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UNIVERZITET U BEOGRADU
FARMACEUTSKI FAKULTET

03 br. 26/102-2
29. 10. 2019. godine

Na osnovu člana 107. Zakona o visokom obrazovanju Republike Srbije, prodekan Fakulteta je dana 29. 10. 2019. godine, donela

REŠENJE

ODOBRAVA se Travica Jovana, studentu Farmaceutskog fakulteta, indeks br. B/14, mirovanje prava i obaveza studenta za školsku 2019/20. godinu.

Obrazloženje

Travica Jovana, student na studijskom programu DAS: Soc. farm. i istraž. f. prakse podneo je zahtev 03 br. 26/102 od 23. 10. 2019. godine prodekanu za nastavu Fakulteta da mu se odobri mirovanje prava i obaveza za školsku 2019/20. godinu. Uz molbu je priložio odgovarajuću dokumentaciju.

Prodekan Fakulteta je razmatrala zahtev 29. 10. 2019. godine i ocenila da je zahtev osnovan, te je doneto rešenje kao u dispozitivu.

PRAVNA POUKA: Protiv ovog rešenja imenovani ima pravo prigovora dekanu Fakulteta u roku od 8 (osam) dana od dana prijema istog.

Rešenje dostaviti: Imenovanom, dekanu, prodekanu za nastavu, sekretaru, Odseku za nastavu i studentska pitanja i arhivi.

PRODEKAN ZA POSLEDIPLOMSKU NASTAVU
I KONTINUIRANU EDUKACIJU



Prof. dr Sandra Vezmar Kovačević

Sandra Vezmar Kovačević

УНИВЕРЗИТЕТ У БЕОГРАДУ
ФАРМАЦЕУТСКИ ФАКУЛТЕТ
Посл.број: 4/204
Дана 30.09.2021 године

На основу Статута Универзитета у Београду, продекан Факултета је дана 30.09.2021 године, донела

ОДЛУКУ

ОДОБРАВА се **ЈОВАНИ МИЛЕНКОВИЋ**, студенту Фармацеутског факултета, индекс бр. 13/14, ~~мировање~~ права и обавеза у школској 2021/2022 години.

Образложење

МИЛЕНКОВИЋ ЈОВАНА, студент на студијском програму ДАС – Социјалана фармација и истраживање фармацијске праксе, поднела је захтев број 4/204 од 30.09.2021 године продекану Факултета да јој се одобри мировање права и обавеза у у школској 2021/2022 години.

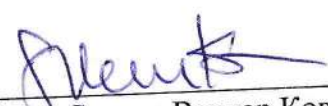
Продекан Факултета је разматрала захтев 30.09.2021.године и оценила да је захтев основан, те је донето решење као у диспозитиву.

ПРАВНА ПОУКА: Против ове одлуке именовани има право приговора декану Факултета у року од 8 (осам) дана од дана пријема истог.

Одлуку доставити: Именованој-ом, декану и Одсеку за наставу и студентска питања.

ПРОДЕКАН ЗА ПОСЛЕДИПЛОМСКУ
НАСТАВУ
И КОНТИНУИРАНУ ЕДУКАЦИЈУ




Проф. др Сандра Везмар Ковачевић

УНИВЕРЗИТЕТ У БЕОГРАДУ
ФАРМАЦЕУТСКИ ФАКУЛТЕТ

03 бр. 4/189

Дана 30.09.2022. године

На основу Статута Универзитета у Београду, продекан Факултета је дана 30.09.2022. године, донела

ОДЛУКУ

ОДОБРАВА се **ЈОВАНИ МИЛЕНКОВИЋ**, студенту Фармацеутског факултета, индекс бр. 13/14, продужетак рока за завршетак студија за школску 2022/2023.

Образложење

ЈОВАНА МИЛЕНКОВИЋ, студент на студијском програму ДАС – Социјална фармација и истраживање фармацеутске праксе, поднео је захтев 03 бр. 4/189 од 30.09.2022. године продекану Факултета да му се одобри продужетак рока за завршетак студија.

Продекан Факултета је разматрала захтев 30.09.2022.године и оценила да је захтев основан, те је донето решење као у диспозитиву.

ПРАВНА ПОУКА: Против ове одлуке именовани има право приговора декану Факултета у року од 8 (осам) дана од дана пријема истог.

Одлуку доставити: Именованој-ом, декану и Одсеку за наставу и студентска питања.

ПРОДЕКАН ЗА ПОСЛЕДИПЛОМСКУ
НАСТАВУ
И КОНТИНУИРАНУ ЕДУКАЦИЈУ


Проф. др Сандра Везмар Ковачевић

УНИВЕРЗИТЕТ У БЕОГРАДУ
ФАРМАЦЕУТСКИ ФАКУЛТЕТ
Посл.број:3/212
Дана 29.09.2023.године

На основу члана 107. Закона о високом образовању Републике Србије, продекан Факултета је дана 29.09.2023. године, донела

РЕШЕЊЕ

ОДОБРАВА се МИЛЕНКОВИЋ ЈОВАНИ, студенту Фармацеутског факултета, индекс бр. 13/2014, мировање права и обавеза у школској 2023/2024.

Образложење

МИЛЕНКОВИЋ ЈОВАНА, студент на студијском програму ДАС – Социјална фармација и истраживање фармацеутске праксе, поднела је захтев бр. 3/212 од 29.09.2023. године продекану за последипломске студије Факултета да јој се одобри мировање права и обавеза у школској 2023/2024.

Продекан Факултета је разматрала захтев 29.09.2023. године и оценила да је захтев основан, те је донето решење као у диспозитиву.

ПРАВНА ПОУКА: Против овог решења именовани има право приговора декану Факултета у року од 8 (осам) дана од дана пријема истог.

Решење доставити: Именованом, декану, продекану за наставу, секретару, Одсеку за наставу и студентска питања и архиви.

ПРОДЕКАН ЗА ПОСЛЕДИПЛОМСКУ НАСТАВУ
И КОНТИНУИРАНУ ЕДУКАЦИЈУ



Проф. др Сандра Везмар Ковачевић

УНИВЕРЗИТЕТ У БЕОГРАДУ
ФАРМАЦЕУТСКИ ФАКУЛТЕТ
Посл.број:5/202
Дана 30.09.2024.године

На основу члана 107. Закона о високом образовању Републике Србије, продекан Факултета је дана 30.09.2024. године, донела

РЕШЕЊЕ

ОДОБРАВА се **МИЛЕНКОВИЋ ЈОВАНИ**, студенту Фармацеутског факултета, индекс бр. 13/2014, продужетак статуса студента у школској 2024/2025.

Образложење

МИЛЕНКОВИЋ ЈОВАНА, студент на студијском програму ДАС – Социјална фармација и истраживање фармацеутске праксе, поднела је захтев бр. 5/202 од 30.09.2024. године продекану за последипломске студије Факултета да јој се одобри продужетак статуса студента у школској 2024/2025.

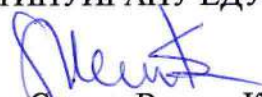
Продекан Факултета је разматрала захтев 30.09.2024. године и оценила да је захтев основан, те је донето решење као у диспозитиву.

ПРАВНА ПОУКА: Против овог решења именовани има право приговора декану Факултета у року од 8 (осам) дана од дана пријема истог.

Решење доставити: Именованом, декану, продекану за наставу, секретару, Одсеку за наставу и студентска питања и архиви.

ПРОДЕКАН ЗА ПОСЛЕДИПЛОМСКУ НАСТАВУ
И КОНТИНУИРАНУ ЕДУКАЦИЈУ




Проф. др Сандра Везмар Ковачевић

УНИВЕРЗИТЕТ У БЕОГРАДУ
ФАРМАЦЕУТСКИ ФАКУЛТЕТ

Посл.број: 3/107

Дана 07.11.2025. године

На основу Статута Универзитета у Београду, продекан за последипломску наставу и континуирану едукацију Факултета је дана 07.11.2025. године, донела

ОДЛУКУ

ОДОБРАВА се **ЈОВАНИ МИЛЕНКОВИЋ**, студенту Фармацеутског факултета, индекс бр. 13/2014, продужетак рока за завршетак студија у школској 2025/2026 години.

Образложење

ЈОВАНА МИЛЕНКОВИЋ, студент на студијском програму ДАС – Социјална фармација и истраживање фармацеутске праксе, поднела је захтев заведен под пословним бројем 3/107 од 04.11.2025. године продекану за последипломску наставу и континуирану едукацију Факултета да јој се одобри продужетак рока за завршетак студија у школској 2025/2026 години.

Продекан а последипломску наставу и континуирану едукацију Факултета је разматрала захтев 07.11.2025.године и оценила да је захтев основан, те је донето решење као у диспозитиву.

ПРАВНА ПОУКА: Против ове одлуке именовани има право приговора декану Факултета у року од 8 (осам) дана од дана пријема истог.

Одлуку доставити: студенту, Одсеку за наставу и студентска питања.

ПРОДЕКАН ЗА ПОСЛЕДИПЛОМСКУ
НАСТАВУ
И КONTИНУИРАНУ ЕДУКАЦИЈУ



Душанка Крајновић
Проф. др Душанка Крајновић