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## Pregledni naučni rad

# POSLOVANJE HRANOM U UGOSTITELJSTVU U SKLADU SA PRINCIPIMA DOBRE PRAKSE I SISTEMA ANALIZE OPASNOSTI I KRITIČNIH KONTROLNIH TAČAKA

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## Kratak sadržaj

Sektor ugostiteljstva predstavlja značajno mesto kada je u pitanju pojava bolesti prenosivih hranom u svetu. Restorani u okviru ugostiteljstva predstavljaju poslednja liniju odbrane hrane pre nego što ona dođe do potrošača. Ugostiteljski objekti koji pružaju usluge hrane i pića, su u obavezi da uspostave sistem za osiguranje bezbednosti hrane u skladu sa principima dobre proizvođačke i higijenske prakse i analize opasnosti i kritičnih kontrolnih tačaka (HACCP). Međutim, specifičnosti ugostiteljstva često predstavljaju barijere za uspešnu implementaciju HACCP sistema. U velikoj meri, na uspešnu primenu sistema upravljanja bezbednošću hrane, može uticati menadžment ugostiteljskih objekata. Pravilno rukovođenje ljudskim resursima, odnosno menadžment ljudskih resursa, mogao bi imati najvažniju ulogu u prevenciji bolesti prenosivih hranom u ugostiteljstvu. Dodatno, veoma je važno na pravilan način, sagledati čitav proizvodni proces i njegove specifičnosti što treba da rezultira primenom odgovarajućih kontrolnih mera kojim će se potencijalne opasnosti eliminisati ili svesti na prihvatljiv nivo. Bezbednost hrane je imperativ kada je u pitanju zdravlje potrošača, pa i efektivnost HACCP sistema, "alata" za postizanje bezbedne hrane, zavisi, između ostalog i od toga koliko je određeni subjekat u poslovanju sa hranom uspeo da prevaziđe sve barijere koje nosi specifičnost ugostiteljskog poslovanja da motiviše svoje zaposlene.

**Ključne riječi:** ugostiteljstvo, specifičnosti, barijere, HACCP

## UVOD

Bolesti prenosive hranom ili trovanje hranom su širok pojam koji obuhvata sva ona stanja ili oboljenja koja nastaju kao posledica konzumiranja hrane koja je kontaminirana patogenim mikroorganizmima i/ili njihovim toksinima i parazitima, ili kontaminirana

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toksinima koji mogu biti prirodnog ili veštačkog porekla. Uzročnici najvećeg broja bolesti prenosivih hranom su patogene bakterije i/ili njihovi toksini i virusi (Kilibarda, 2019). Neki od ovih hazarda su predmet zabrinutosti celokupne zajednice kada je u pitanju javno zdravlje, neki od hazarda su uobičajeni za određene regione, odnosno nerazvijene ili zemlje u razvoju. Međutim, jedno je sigurno, a to je da se u vreme globalizacije svi ovi hazardi mogu širiti veoma brzo duž lanca hrane, bez obzira na granice. Zato je potrebno imati na umu da se bolesti prenosive hranom mogu sprečiti i da svako ima ulogu u toj prevenciji u svom domenu (WHO, 2015).

Svetske organizacije koje se bave javnim zdravljem, objavljuju podatke o broju obolelih od bolesti prenosivih hranom, mada je potrebno naglasiti da je ipak reč o procenjenim, ali ne i o apsolutno tačnim brojevima. Razlog tome je što značajan broj slučajeva bolesti prenosivih hranom ostaje neevidentiran. Izostanak evidencije ovih slučajeva je posledica toga što oboleli najčešće ne zatraže medicinsku pomoć, i kada je zatraže, uzorci se ne uzimaju za laboratorijsku analizu, a često zbog velikog broja uzročnika i nije moguće identifikovati onaj pravi. U slučajevima kada se dijagnoza i postavi, često nadležne institucije ne budu informisane o tome (Zanin i sar., 2017; Kilibarda, 2019). Prvi izveštaj o proceni incidence pojave bolesti prenosivih hranom i stope mortaliteta na globalnom nivou sačinila je Svetska zdravstvena organizacija. Prema njihovim procenama hazardi koji se prenose hranom, bili su uzročnici 600 miliona slučajeva obolelih (odnosno oboleo je jedan od deset stanovnika), a 420.000 oboljenja bilo je sa smrtnim ishodom na globalnom nivou u 2010. godini. Čak jedna trećina umrlih od oboljenja prenosivih hranom su bila deca (WHO, 2015).

U Americi je procenjeno da godišnje oboli 9,4 miliona ljudi od bolesti prenosivih hranom izazvanih patogenim mikroorganizmima i parazitima, od tog broja 56.000 bude hospitalizovano, a 1.300 slučajeva završi smrtnim ishodom (Scallan i sar., 2011). Od ovog broja, više od polovine bolesti prenosivih hranom koje su prijavljene, u vezi su sa ishranom van kuće, odnosno u restoranima (Angulo i sar., 2006). Inače se u Americi duži niz godina, najveći broj pojava oboljenja prenosivih hranom, beleži u restoranima (CDC, 2019).

Međutim, za razliku od Amerike, u Evropskoj uniji godinama je zabeležen trend da se jedna od tri bolesti prenosivih hranom događaju u domaćinstvima, što je razumljivo s obzirom da se procentualno najveći broj obroka i realizuje kod kuće. Na drugom mestu, odmah iza domaćinstva po učestalosti pojave bolesti prenosivih hranom, nalaze se subjekti koji pružaju usluge hrane i pića (restorani, barovi, kantine, catering itd) (EFSA, 2018).

Menjajući životne stilove i navike, čovek je danas izložen hroničnom nedostatku vremena. Zbog toga je sve više usmeren da se hrani van kuće, odnosno u restoranima (de Andrade i sar., 2019; Kilibarda, 2019). Bez obzira da li je to kantina u radnoj organizacija, ili restoran brze hrane na pauzi za ručak, porodični ručak u *fine dining* restoranu, subjekti koji pružaju usluge hrane i pića postaju mesta, gde ljudi imaju veću šansu da dođu u kontakt sa hazardima u hrani. Danas je proizvodnja hrane centralizovana i ugostiteljski objekti mogu nabavljati hranu koja se proizvodi na različitim i udaljenim geografskim područjima. U

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tom slučaju, ukoliko nabavljena sirovina sadrži neke opasnosti (biološke, hemijske, fizičke), jasno je da može biti potencijalni izvor opasnosti za gotova jela. Dodatno, pojava oboljenja koja se prenose hranom u tom slučaju mogu poprimiti široke i ozbiljne razmere, kada se može govoriti i o globalizaciji (ne)bezbedne hrane (Zanin i sar., 2017; Kilibarda, 2019; Nayak and Waterson, 2019; Kilibarda, 2020). Povećanje broja međunarodnih putovanja (zarad posla ili zadovoljstva) utiče na pojavu određenih bolesti prenosivih hranom, jer na ovaj način osobe dolaze u kontakt sa patogenim mikroorganizmima sa kojima se do tada nisu susretale, a poznato je da prvi kontakt sa „novim“ patogenima osobu čini prijemčivom za razvoj bolesti (Alberer and Löscher, 2014). Posebno u prilog tome govori i činjenica da je najveći broj putnika zapravo i nije svestan rizika koji postoji prilikom konzumiranja, po prvi put, tradicionalnih i egzotičnih jela kada su na putovanju u nekoj destinaciji (Robertson i sar., 2014; Kilibarda, 2020). Jasno je da zdravlje gostiju jeste imperativ, ali činjenica je i da pojava bolesti prenosivih hranom predstavlja značajan finansijski gubitak, koji se ogleda kroz smanjen broj gostiju, „loš marketing“ i gubitak lojalnosti posetilaca. Pored toga, pojava bolesti prenosivih hranom utiče i na ekonomski razvoj, posebno na turizam, poljoprivredu i izvoz hrane.

Ponuda hrane kroz sektor ugostiteljstva donosi značajan doprinos ukupnoj ponudi hrane na nacionalnom nivou, zapošljava veliki broj radnika, što sve zajedno utiče na razvoj lokalne ekonomije. Pod terminom ugostiteljstvo podrazumevaju se usluge smeštaja i ishrane, odnosno podrazumevaju se aktivnosti koje ne obuhvataju pripremu hrane (usluge smeštaja), ali i aktivnosti koje se odnose na uslugu hrane i pića za trenutnu upotrebu, što podrazumeva i postojanje prostora u kojima se ta hrana i priprema (Al Yousuf i sar., 2015). Sa tim u vezi, usluge hrane i pića su definisane kao aktivnosti koje obezbeđuju kompletne obroke ili pića koje su pripremljeni za trenutnu upotrebu, bilo u konvencionalnim (tradicionalnim restoranima), samouslužnim ili restoranima za poneti, sa mestima za sedenje ili ne (UN, 2008). Samim tim, usluga hrane, definisana na ovaj način, predstavlja preko 60% svih subjekata koji posluju hranom u okviru celokupne industrije hrane, jer obuhvata i restorane i ishranu u bolnicama, hotelima, zatvorima, školama firmama itd, odnosno obuhvata i institucionalne i komercijalne restorane. Subjekti koji pružaju usluge hrane i pića, zastupljeni su od uličnih prodavaca, pa sve do restorana koji su deo velikih korporacijskih lanaca, ali je najveći broj njih predstavljeno kroz mala preduzeća kojima upravljaju sami vlasnici (Al Yousuf i sar., 2015).

### **Ko je odgovoran za proizvodnju/ponudu bezbedne hrane?**

Obaveza svakog proizvođača, odnosno svih onih koji posluju hranom, jeste da tržištu pruže kvalitetnu hranu sa određenim nutritivnim i senzor skim osobinama koje potrošač očekuje, ali istovremeno i higijenski ispravnu i bezbednu hranu, koja će pre svega biti neškodljiva za zdravlje potrošača (Kilibarda, 2019). Suštinski i zdravorazumski može se i mora se reći da svaka karika u lancu hrane, od farme do trpeze ima određeni stepen odgovornosti kada je u pitanju bezbednost hrane, a kada je u pitanju ishrana u restoranima, za njih se kaže da su poslednja linija odbrana hrane pre nego što ona dođe do potrošača. Cilj sistema

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upravljanja bezbednošću hrane jeste da se njihovom implementacijom identifikaciju potencijalne opasnosti i utvrde mesta u procesu proizvodnje u kojima one mogu predstavljati značajan rizik za bezbednost hrane, ali takođe mesta u kojima ih je moguće kontrolisati (smanjiti na prihvatljiv nivo ili eliminisati) (Bunčić, 2009). Prema Regulativi (2019), „Subjekti u poslovanju hranom dužni su da uspostave sistem za osiguranje bezbednosti hrane u svim fazama proizvodnje, prerade i prometa hrane, osim na nivou primarne proizvodnje, u svakom objektu pod njihovom kontrolom, u skladu sa principima dobre proizvođačke i higijenske prakse i analize opasnosti i kritičnih kontrolnih tačaka (HACCP)“. Ugostiteljski objekti koji pružaju usluge hrane i pića, u smislu ovoga zakona su „subjekti koji posluju hranom“, i u obavezi su da sprovode redovne samokontrole higijenskih uslova pripremanja hrane u skladu sa uspostavljenim HACCP sistemom, odnosno Principima sistema analize opasnosti i kritičnih kontrolnih tačaka. Ovim, ugostiteljski objekat osigurava bezbednost hrane, dok u isto vreme gosti imaju mogućnost da uživaju u kvalitetno pripremljenim i ponuđenim jelima (Kilibarda, 2019).

Kako bi sistem HACCP mogao da se implementira i sprovodi na adekvatan način u subjektima koji posluju hranom, neophodno je da pre svega u potpunosti budu razvijeni i primenjeni preduslovni programi dobre proizvođačke i dobre higijenske prakse (*Good Manufacturing Practice* (GMP) i *Good Hygiene Practice* (GHP) (Bunčić, 2009; Al Yousuf i sar., 2015). Implementacijom preduslovnih programa obezbeđuje se poštovanje opštih higijenskih principa i adekvatnih postupaka i organizacije u svim aktivnostima koji se odnose na hranu. Osnovni elementi dobre proizvođačke i higijenske prakse, između ostalog, primenjuju kroz različite oblasti, a neke od njih su i struktura pogona i njegovo održavanje, odnosno, u ovom slučaju, struktura prostorija za hranu u ugostiteljskom objektu i njihovo čišćenje i sanitacija, kao i rukovanje sirovinama, od njihovog transporta, prijema, pripreme do čuvanja gotove hrane (Kilibarda, 2019). U tom smislu, preduslovni programi i HACCP čine nerazdvojne i kompatibilne delove jedne celine, odnosno upravljanja bezbednošću hrane.

Osnovni cilj primene HACCP sistema je proizvodnja bezbedne hrane, uz što je više moguće ekonomičnu i efikasnu proizvodnju, odnosno smanjenje gubitaka hrane, poboljšanje kvaliteta, obezbeđenje bolje kontrole zaliha sirovina, povećanje profita i angažovanje i svest zaposlenih u poslovima koje se odnose na bezbednost hrane, čime se povećava njihova kompetentnost.

### **Specifičnosti ugostiteljskog poslovanja hranom**

Kada se govori o primeni HACCP sistema u ugostiteljstvu i uopšte u sektoru koji se bavi usluživanjem hrane, često se susreću problemi u praksi. Postoji čitav niz specifičnosti ovih subjekata u odnosu na prehrambenu industriju. Neke od njih su veliki broj ulaznih sirovina i gotovih proizvoda, mnogobrojne recepture i složenost gotovih jela, ali i uglavnom mali prostor na kojem se odvijaju proizvodnja različitih proizvoda i to istovremeno (Eves and Dervisi, 2005; Taylor and Forte, 2008; Garayoa i sar., 2011). Uz to, još jedna od specifičnosti jeste i aktivnost koja se odnosi na serviranje hrane; ugostiteljski objekti

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istovremeno i proizvode i serviraju hranu, a razlike postoje i između samih načina serviranja hrane (*a la carte*, švedski sto ili posluživanja u hotelskim sobama) (Savović i Ćurčić, 2008; Taylor and Forte, 2008). Dugi vremenski period koji protekne od pripreme hrane do njenog posluživanja predstavlja rizik za nastanak kvarenja hrane, pogotovo u onim situacijama kada nije obezbeđen takozvani „topli lanac“ (čuvanje hrane na toplom do posluživanja). Još neke od specifičnosti ugostiteljstva kada je reč o primeni HACCP-a, ili možda bolje reći barijere za njegovu primenu, navode se neujednačena proizvodnja, loša podrška ili nedovoljna podrška nauke, slaba opremljenost, odnosno oprema koja ne postiže ili nema zahtevane performanse (Wandolo i sar., 2018), zatim loše i nedovoljno detaljan opisan proizvod, ali i stalne promene u ponudi jela zbog prilagođavanja zahtevima gostiju, ali i konkurentnosti na tržištu (Savović i Ćurčić, 2008).

Ono što je već istaknuto jeste i da je ugostiteljstvo predstavljeno velikim brojem malih preduzeća, koja posluju bez podrške i prednosti koje imaju subjekti koji posluju u sklopu velikih korporacija. Samim tim zaključuje se i da neretko imaju i relativno nisku stopu profita, što znači da raspolažu sa manje finansijskih resursa koje bi opredelili za ulaganje u politiku kvaliteta bezbednosti hrane (Eves and Dervisi, 2005; FDA, 2006; Taylor and Forte, 2008). Zato se često kao razlog navode problemi kao što su nedostatak novca, vremena i znanja koje se odnose na implementaciju HACCP-a, kao i cena eksternih konsultantskih usluga na koje su subjekti najčešće i upućeni (Taylor, 2008).

Kao najčešći razlozi značajnog procenta pojave bolesti prenosivih hranom u ugostiteljstvu, navode se: sirovina koja potiče iz nebezbednih i neproverenih izvora, neadekvatna termička obrada hrane, neodgovarajuća temperatura čuvanja hrane, kao i nepravilni postupci prilikom odmrzavanje hrane, kontaminirana oprema, loša higijena i/ili bolest zaposlenih, neodgovarajuće rukovanje hranom koje dovodi do pojave unakrsne kontaminacije, sunđer i krpe koji se u kuhinji koriste za više namena, jela koja su pripremljena mnogo pre nego što će biti uslužena (usled lošeg planiranja) (Bolton and Maunsell, 2004; Bolton i sar., 2008; Adesokan i sar., 2015). Zaposleni u ovoj industriji imaju različiti stepen obrazovanja i različitih su komunikacionih veština. S obzirom da je poslovanje ugostiteljskog sektora, uglavnom sezonskog karaktera, osoblje se često menja, što je jedan od problema sa aspekta njihove obučenosti, a pored toga i nepoznavanje jezika na kojima se izvode interni treninzi mogu biti prepreka za uspešan obuku (Panisello i Quantick, 2001; Taylor and Forte, 2008; Taylor, 2008; Casolani and Del Signore, 2016). U restoranima velikih hotelskih lanaca, gde finansijski, ali i infrastrukturni resursi ne predstavljaju problem, neobučeno osoblje i izostanak obuka može biti slaba tačka u procesu proizvodnje hrane, koja vodi ka povećanju rizika za pojavu nebezbedne hrane (Matias i sar., 2013; Casolani and Del Signore, 2016). Ljudski faktor kada je u pitanju unakrsna kontaminacija hrane u ugostiteljstvu predstavlja značajan rizik po bezbednost hrane (McIntyre i sar., 2013). Zbog toga su obuke zaposlenih koji rukuju hranom kada je u pitanju primena dobre higijenske prakse, najrasprostranjenija strategija koja efikasno utiče na poboljšanje bezbednosti hrane (Hislop and Shaw, 2009; Medeiros i sar., 2011; Martins i sar., 2012; Rossi i sar., 2017; Zanin i sar., 2017).

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Baš zbog toga što osoblje može predstavljati značajan rizik kada je u pitanju bezbednost hrane u ugostiteljstvu, pravilno rukovođenje ljudskim resursima, odnosno menadžment ljudskih resursa, mogao bi imati najvažniju ulogu u prevenciji bolesti prenosivih hranom u ugostiteljstvu (Eves and Dervisi, 2005; Bolton i sar., 2008; Rossi i sar., 2017). Njihovo razumevanje aktivnosti koje se izvode u cilju osiguranja bezbedne hrane su od suštinskog značaja kada je u pitanju definisanje odgovornosti i zadataka za svakog zaposlenog koji rukuje hranom, što podrazumeva i organizovanje obuka za svakog od njih (Garayoa i sar., 2011). Njihov zadatak je da samim tim osiguraju kako vreme, tako i ostale resurse za edukaciju i trening zaposlenih. Međutim, kako bi ove aktivnosti bile efektivne i efikasne, menadžeri moraju da budu kvalifikovani, kompetentni i da poseduju odgovarajuća znanja iz oblasti bezbednosti hrane što u praksi najčešće i nije slučaj, već se u svom poslu oslanjaju na iskustvo (Ko, 2013; Rebouças i sar., 2017), što često predstavlja prepreku za uspešnu implementaciju politike bezbednosti hrane.

### **Primena principa dobre prakse i sistema analize opasnosti i kritičnih kontrolnih tačaka u ugostiteljstvu**

Faze proizvodnje i usluživanja hrane u ugostiteljstvu obuhvataju najčešće, ali se ne ograničavaju na: prijem sirovina, skladištenje, pripremu, termičku obradu, hlađenje, podgrevanje, hladno i toplo izlaganje hrane, serviranje, dekoraciju/pakovanje, serviranje, prodaju (Popov-Raljić i Blešić, 2012). Sve ove faze potencijalno mogu biti mesta gde može doći do kontaminacije hrane, što može uticati na bezbednost gotovog jela. Jasno je da se ukoliko se hranom postupa u skladu sa dobrom proizvođačkom i dobrom higijenskom praksom i u skladu sa principima sistema analize opasnosti i kritičnih kontrolnih tačaka, smanjuje se rizik kontaminacije hrane na minimum, što će obezbediti i bezbedan gotov proizvod (Kilibarda, 2019).

Kao opšte pravilo primene principa dobre prakse i sistema analize opasnosti i kritičnih kontrolnih tačaka u ugostiteljstvu, smatra se da bi preduslovni programi trebalo da se koriste za kontrolu opasnosti koji su povezani sa uslovima okoline (prostorije i strukture, usluge, osoblje, postrojenja i oprema), a HACCP sistem treba koristiti u cilju kontrole opasnosti povezanih direktno sa procesima vezanim za hranu (skladištenje, proces obrade i pripreme) (Bolton and Maunsell, 2004). U osnovi preduslovni programi su univerzalna načela koja se fokusiraju na prostor, opremu i osoblje, dok je HACCP specifičan i fokusira se na sirovinu, proizvodnju i gotov proizvod.

Osnovni elementi dobre proizvođačke i dobre higijenske prakse treba da pre svega obezbede odgovarajući radni prostor (odnosno infrastrukturne zahteve), zaštitu hrane od kontaminacije uzrokovane biološkim, hemijskim i fizičkim opasnostima, kontrolu rasta mikroorganizama i ispravnost opreme, i to pre svega one opreme koja treba da obezbedi odgovarajuće temperaturne uslove u kojima se hrana čuva (frižideri, zamrzivači), u kojima se hrana termički obrađuje (pećnice) ili u kojima se poslužuje i izlaže (tople vitrine i stolovi). Takođe preduslovni programi u ugostiteljstvu mogu da obuhvate i menadžment alergena, specifikaciju nabavke, izradu detaljnih receptura, programe obuka osoblja, kao i

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standardne operativne postupke koji se odnose na čišćenje i sanitaciju opreme i prostora (FDA, 2006).

Često implementacija preduslovnih programa, a koji se odnose na strukturu prostora, odnosno infrastrukturne zahteve, prostor i prostorije, mogu predstavljati problem za mala preduzeća, što se ne može reći kada su u pitanju veliki korporacijski lanci kao i franšize restorana i/ili hotela. U ugostiteljstvu, uzimajući u obzir specifičnosti, problem predstavlja istovremena priprema različitih vrsta jela i proces usluživanja, a često je problem i obezbediti poseban prostor za skladištenje, obradu i pripremu hrane, ili te aktivnosti vremenski razdvojiti. Ovo može u ugostiteljstvu predstavljati značajan rizik za pojavu unakrsne kontaminacije. Takođe, loša higijena osoblja, nedovoljan stepen obuke osoblja i manjak svesti zaposlenih o bezbednosti hrane, u ugostiteljstvu, budući na njene specifičnosti, može predstavljati značajan rizik kada je u pitanju bezbednost hrane u ugostiteljstvu (Martins i sar., 2012; Serafim i sar., 2018), s obzirom da većina bolesti prenosivih hranom u ugostiteljstvu nastaje kao posledica neadekvatnog rukovanja hranom (Zanin i sar., 2017; Barjaktarović-Labović i sar., 2018).

Nakon uspostavljanja preduslovnih programa, uvođenje HACCP se implementira kroz dvanaest koraka, odnosno kroz pet koraka i sedam principa 1. obuka i formiranje tima za HACCP; 2. detaljan opis proizvoda; 3. opis namene proizvoda i identifikovanje korisnika hrane; 4. izrada dijagrama toka procesa proizvodnje; verifikovanje dijagrama toka procesa proizvodnje na licu mesta, dok sedam principa podrazumevaju: Princip 1. Analiza rizika koja predstavlja osnovu za izradu HACCP plana i osnovu za definisanje svih daljih koraka; Princip 2. Određivanje kritičnih kontrolnih tačaka - korak u procesu proizvodnje u kojem se primenjuje kontrola u cilju eliminacije opasnosti ili smanjenje te opasnosti na prihvatljivu nivo; Princip 3. Utvrđivanje kritičnih granica, odnosno, minimalne i maksimalne vrednosti za svaku kontrolnu tačku, za biološke, hemijske i fizičke opasnosti; Princip 4. Utvrđivanje sistema za praćenje, odnosno nadgledanje kritičnih tačaka; Princip 5. Definisanje i sprovođenje korektivnih mera; Princip 6. Verifikacija funkcionisanja sistema i Princip 7. Uspostavljanje dokumentacije HACCP sistema (Bunčić, 2009).

Iako Regulativa (2019) predviđa da je „subjekt u poslovanju hranom dužan da ima u stalnom radnom odnosu odgovorno lice odgovarajuće stručne spreme za sprovođenje dobre proizvođačke i higijenske prakse i primenu HACCP“ u ugostiteljskim objektima, ovaj zahtev predstavlja potencijalno mesto za zabrinutost. Često se događa da su vlasnici objekta ujedno i menadžeri, koji nisu kvalifikovani i nemaju odgovarajući stepen stručne spreme, a u aktivnostima koje se odnose na bezbednost hrane, oslanjaju se na svoje dugogodišnje iskustvo ili menadžerske veštine. Mali objekti nisu u mogućnosti da imenuju HACCP tim zbog nedovoljnog broja zaposlenih, te su samim tim usmereni na angažovanje eksternih konsultanata. Ovakve usluge uglavnom predstavljaju i finansijske izdatke koji za njih nisu opravdani, budući da je često slučaj da menadžment ne vrednuje sam značaj bezbednosti hrane u dovoljnoj meri (prednost daju ambijentu, ukusu i prezentaciji hrane, atraktivnosti lokacije) (Taylor, 2008; Wallace i sar., 2018).

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Detaljan opis svakog gotovog jela, ali i izrada dijagrama toka svakog pripremljenog proizvoda predstavlja veliki posao, naročito za restorane koji imaju široku ponudu jela. Zbog velikog broja kombinacija proizvodnih procesa, obrade, pripreme i posluživanja hrane, u ugostiteljstvu se preporučuje grupisanje proizvodnih procesa u odnosu na iste aktivnosti u toku pripreme i usluživanja hrane. Sagledavanje proizvodnih procesa na ovakav način omogućava da se ne pristupa svakom jelu posebno, te se na taj način čuvaju i vreme i resursi. Jasno je da iako postoje razlike u samim procesima proizvodnje različitih jela svrstanih na ovaj način, uopšteno se može reći da će kontrolne mere koje se primenjuju u cilju eliminacije ili redukcije opasnosti, u svakom procesu biti iste i zasnivaće se na tome koliko puta hrana prolazi kroz opasnu zonu. Pod opasnom zonom podrazumeva se temperaturna zona između 5°C i 60°C. Ovo je opseg temperature koji najvećem broju bakterija pogoduje za rast i razmnožavanje (FDA, 2006). Postoje tri grupe proizvodnih procesa koji se zasnivaju na tome koliko puta hrana prolazi kroz opasnu zonu (*Food Code*, 2001). Prva grupa proizvodnih procesa obuhvata sledeće faze: prijem – priprema – serviranje (bez termičke obrade). U prvi proizvodni proces, ubrajaju se sirova jela kao što su suši, sašimi, sveže školjke i salate i druga *ready to eat* hrana kao što su sirevi, zatim pasterizovani proizvodi od mleka (pavlačka, jogurt) i dr. Druga grupa proizvodnih procesa obuhvata: prijem – priprema - termička obrada – izlaganje hrane – serviranje (hrana prolazi jednom kroz opasnu zonu). Ovim proizvodnim procesom pripremaju se, na primer grilovana piletina, koja se služi topla odmah nakon termičke obrade. Treća grupa proizvodnih procesa obuhvata sledeće faze: prijem – priprema – termička obrada – hlađenje – podgrevanje - toplo čuvanje – serviranje (hrana više puta prolazi kroz opasnu zonu). Primeri bi bili složena jela kao što su jela koja se pripremaju u većim količinama i čuvaju radi serviranja narednog dana (supe, čorbe itd.) (Seward, 2000; FDA, 2001).

Takođe, grupisanje jela može se vršiti i u odnosu na način pripreme i serviranja u više grupa, kao što su termička obrada hrane/toplo posluživanje; termička obrada hrane/hladno posluživanje; hladna priprema hrane/hladno posluživanje i u odnosu na način posluživanja (Popov-Raljić i Blešić, 2012).

U osnovi, bez obzira koji način grupisanja se primeni, bitno je da se posao olakša, kao i da se sistem rastereti dokumentacije. Cilj ovakvog grupisanja jela jeste, da bez obzira na različitost gotovih proizvoda, primenjene kontrolne mere mogu biti iste. Tako na primer određeni restoran može pripremati na desetine jela, koji se proizvode istim proizvodnim procesom, odnosno, primera radi, jela prolaze jednom kroz opasnu zonu. Svako od tih jela može biti izvor različitih opasnosti, međutim kontrolna mera, odnosno adekvatna termička obrada, eliminiše ili smanjuje sve te hazarde na prihvatljiv nivo. Na primer, za grilovanu piletinu značajni biološki hazardi su *Salmonella* i *Campylobacter*, dok su za rolat od mlevenog mesa značajni biološki hazardi *Salmonella*, *E. coli* O157:H7, *Bacillus cereus* i *Clostridium perfringens*, međutim kontrolna mera, a to je termička obrada, će za oba jela biti ista. Dodatno, ukoliko se ova jela ne poslužuju odmah, njihovo pravilno toplo čuvanje, u određenom vremenskom periodu, takođe može biti ista kontrolna mera, koja će sprečiti rast i stvaranje toksina sporulišućih mikroorganizama, koji su preživeli proces termičke

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obrade (Bolton and Maunsell, 2004; FDA, 2006).

### **Potencijalne kritične kontrolne i kontrolne tačke u proizvodnom procesu u ugostiteljstvu**

Prilikom uspostavljanja kritičnih kontrolnih i kontrolnih tačaka, subjekti koji pripremaju i uslužuju hranu, uvek treba da vode računa, o sopstvenim potrebama, odnosno da one budu u skladu sa veličinom i tipom objekta, obimom proizvodnje i vrstom proizvodnog procesa, samih svojstava sirovine i gotovih proizvoda koje pripremaju, kako sistem ne bi prekomerno opteretio sam proces proizvodnje, izgubivši pri tome svoju svrhu (Wallace i sar., 2018).

Neki od primera kritičnih kontrolnih tačaka u ugostiteljstvu mogle bi biti:

*Prijem sirovina.* Prijem sirovina je važna faza u procesu proizvodnje hrane u ugostiteljstvu. Na prijemu, rizik može biti sirovina koja je kontaminirana patogenim bakterijama i/ili njihovim toksinima. Pre svega, važno je iz tog razloga da se nabavka sirovine vrši isključivo od proverenih dobavljača. U ovoj fazi preporučuje se primena dve vrste kontrolnih mera. Sirovinu koja zahteva temperaturni režim potrebno je odmah po prijemu uskladištiti u režim hladnog lanca. Naročiti oprez, na samom prijemu treba imati kada je u pitanju *ready-to-eat*, hrana, ali i hrana koja neće biti termički obrađena pre serviranja. Kontrolna mera koja bi obezbedila praćenje temperature na samom prijemu ovakvih sirovina, bila bi adekvatna mera kontrole prisustva opasnosti u ovakvoj hrani. Posebno je važno ovu meru primenjivati kada je reč o prijemu pojedinih vrsta morskih riba, zbog mogućnosti pojave skromboidnog toksina, odnosno histamina. Takođe, na samom prijemu ribe koja je namenjena da se konzumira sirova, a potiče iz podneblja gde postoji rizik od pojave određenih patogenih parazita u njoj, veoma je važno da se odmah zamrzne. Još neke od kontrolnih mera mogle bi biti i provera izjava o usaglašenosti sirovina izdatih od strane akreditovanih laboratorija, zatim vizuelna kontrola sirovine, rokovi trajanja, celovitost ambalaže kao i čistoća i higijena transportnog vozila (FDA, 2006; Bolton and Maunsell, 2004).

*Skladištenje.* Kada se hrana pre priprema čuva u uslovima hladnog lanca u frižideru, sistem bezbednosti hrane trebalo bi da bude fokusiran na to da se obezbedi temperatura koja će sprečiti rast i razmnožavanje patogenih mikroorganizama u hrani, što je naročito važno za proizvode spremne za upotrebu (gotova hrana). Takođe važno je voditi računa o tome da se hrana skladišti na način da se spreči unakrsna kontaminacija (hrana mora biti pokrivena, potrebno je odvojeno skladištiti sirovu i termički obrađenu hranu i sl.), zatim i da se omogući cirkulacija vazduha u samom rashladnom uređaju. Čuvanje hrane u zamrznutom stanju, u zamrzivačima, pri temperaturama nižim od  $-12^{\circ}\text{C}$ ) takođe se može razmatrati kao potencijalna kritična kontrolna tačka. Pri ovim temperaturama sprečava se rast, razmnožavanje i stvaranje toksina bakterija, zbog čega je važno obezbediti i kontrolisati zahtevani temperaturni režim i hranu čuvati na adekvatan način kako ne bi došlo do unakrsne kontaminacije (Bolton and Maunsell, 2004; FDA, 2006).

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*Odmrzavanje sirovina.* Zamrznutu hranu treba odmrzavati u frižiderima ili samo ukoliko je neophodno u mikrotalasnoj pećnici koristeći odgovarajući program. Važno je spomenuti da odmrzavanje na sobnoj temperaturi mogu omogućiti razmnožavanje bakterija i stvaranje toksina ukoliko im se uz optimalnu sobnu temperaturu omogući i dovoljno vremena.

*Priprema hrane.* Ova faza u procesu proizvodnje hrane uključuje veliki broj aktivnosti koje je neophodno nadzirati i kontrolisati. Priprema hrane obuhvata različite procese kao što su sjedinjavanje različitih sastojaka, seckanje, mlevenje, gnječenje, sitnjenje i dr. U ovoj fazi važno je razviti procedure koje će smanjiti na minimum mogućnost rasta mikroorganizama i kontaminaciju hrane od strane zaposlenih i/ili opreme (Popov-Raljić i Blešić, 2012). Da bi se sprečio rast mikroorganizama važno je voditi računa o tome da se hrana što manje vremena drži na ambijentalnoj temperaturi, odnosno u opasnoj zoni. To se može postići pripremom hrane u manjim količinama, što ujedno znači i manje vremena utrošenog za pripremu. Međutim ovo jeste i problem u ugostiteljstvu budući da je priprema hrane nepredvidiva zbog same prirode posla (osim kada se radi o meni restoranima) (Kilibarda, 2020). Kako bi se sprečila unakrsna kontaminacija hrane od strane zaposlenih i opreme, pribora i posuđa u fazi pripreme hrane, neophodno je imati implementirane procedure koje se odnose na higijenu zaposlenih i njihovo ponašanje u prostoru sa hranom kao i dobro definisan plan čišćenja i dezinfekcije površina, prostora i opreme, i razdvajanje nekompatibilnih aktivnosti prostorno i/ili vremenski (Tešanović, 2017).

*Termička obrada.* Termička obrada hrane animalnog porekla je najefikasniji postupak koji se primenjuje u cilju eliminacije ili redukcije bioloških opasnosti u gotovim jelima. Zbog toga se i preporučuje učestalo praćenje temperature termičke obrade i vreme koje je potrebno da bi se određena kritična vrednost dostigla. Literaturni podaci govore da bi temperatura u centru proizvoda trebalo da bude najmanje 70 °C i to u trajanju od najmanje dva minuta ili da dostigne najmanje 75° C u centru hrane. Ove temperature su dovoljne da unište patogene bakterije kao što su *Salmonella*, *Campylobacter*, *L. monocytogenes* i *Y. enterocolitica*. Niže temperature termičke obrade dozvoljene su, ali samo za pripremu specijalnih jela ili pripreme jela određenim tehnikama kao što je na primer *sous vide* tehnika pripreme hrane (Kilibarda i sar., 2018). Međutim, u proizvodnom procesu, kakvo je ugostiteljstvo, gotovo je nerazumno u jednom subjektu koji proizvodi, na primer, na stotine hamburgera, meriti temperaturu svakog hamburgera. U ovom slučaju, razumno bi bilo tokom rutinskog rada potvrditi da li sam proces termičke obrade i oprema koja se koristi, jesu u mogućnosti da postignu zahtevanu temperaturu u proizvodi i/ili u samoj opremi. Kada se utvrdi da li sam proces postiže zadovoljavajuće kriterijume, učestalost merenja temperature može se smanjiti. Ipak posebno je važno uspostaviti adekvatne kritične granice tokom procesa termičke obrade i to naročito ukoliko se radi o hrani životinjskog porekla (Bolton and Maunsell, 2004).

*Hlađenje termički obrađene hrane.* Termički obrađena hrana trebalo bi da se ohladi odmah nakon završetka termičke obrade korišćenjem opreme za brzo hlađenje (*blast chiller*). Ukoliko ovakav uređaj nije dostupan, jelo bi trebalo da se stavi u frižider u roku od 90

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minuta od završetka procesa obrade. Oprema bi trebalo da bude u mogućnosti da temperaturu u centru jela, snizi do 10°C u roku od 150 minuta. Predugo hlađenje hrane (duže od šest sati) može dovesti do toga da se stvore uslovi u hrani koji omogućavaju rast sporogenih bakterija, koje su preživjele termičku obradu i u ovakvim uslovima imaju mogućnost da isključuju i produkuju toksine. Obzirom da su toksini termostabilni, kasnija faza u procesu pripreme hrane, odnosno podgrevanje, neće dovesti do njihove eliminacije (Kilibarda, 2019).

*Podgrevanje.* Bitno je da kada se podgreva hrana koja je pre toga bila termički obrađena i ohlađena, postigne temperatura od minimalno 73°C u centru proizvoda. Odmah nakon podgrevanja hrane, hranu je potrebno poslužiti i to u roku od 30 minuta. Temperatura podgrejane hrane, ukoliko se izlaže na toplom stolu, ne sme pasti ispod 65°C. Jasno je da se ove zadate temperature moraju kontrolisati (Bolton and Maunsell, 2004; Kilibarda, 2019).

*Čuvanje hrane tokom usluživanja.* Hrana u ugostiteljskim objektima može biti izložena za prodaju na različite načine (u obliku hladnih ili toplih bife stolova, na kolicima za rezanje, kolicima za deserte, izložbenim vitrinama) te je jasno je da je na ovaj način izložena dodatnim rizicima (Popov-Raljić i Blešić, 2012). Zbog toga se ova faza može smatrati kritičnom tačkom te se samim tim mora i kontrolisati. Prevencija rasta i razmnožavanja bakterija može se osigurati ograničavanjem vremenskog perioda u kojem je hrana izložena (to vreme treba da bude kraće od onog koje je potrebno za značajno povećanje broja bakterija), ili čuvanjem hrane na temperaturama koje sprečavaju rast bakterija (izvan opasne zone). Termički obrađeno gotovo jelo koje se skladišti na toplom, mora da bude pri temperaturi većoj od 65°C, što se može postići izlaganjem jela na toplom stolu (uređajima za održavanje toplote), a uz ograničeno vreme izlaganja na maksimalno dva sata. Izostanak kontrole nad uspostavljenim kritičnim granicama (temperatura i/ili vreme) moglo bi da dovede do stvaranja uslova za rast patogenih bakterija kao što su *S. aureus*, *C. perfringens* i *B. cereus*. Kada je u pitanju hladno serviranje hrane hranu prilikom posluživanja je dopušteno izložiti najduže dva sata nakon što je izvađena iz rashladnog uređaja (na rashladnim pultovima do četiri sata) (Bolton and Maunsell, 2004; FDA, 2006).

*Serviranje hrane.* Serviranje hrane je poslednja aktivnost pre nego što hrana dospe do potrošača. U ovoj fazi procesa proizvodnje hrane u ugostiteljstvu, od velikog značaja je sprečiti mogućnost unakrsne kontaminacije hrane od strane zaposlenih, što se postiže održavanjem lične higijene zaposlenih, njihovim treninzima i obukama i razvoju svesti o odgovornosti za bezbednost hrane. Posebna specifičnost u ugostiteljstvu predstavlja i hotelsko posluživanje hrane u sobama, gde dodatne rizike mogu predstavljati, dužina vremena prenosa hrane od porcioniranja u kuhinji do isporuke u sobu, neadekvatne temperature pri kojima se hrana čuva, neadekvatna zaštita hrane u toku dostave i dr. (Savović i Ćurčić, 2008; Tešanović, 2017).

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## ZAKLJUČAK

Dosledna primena preduslovnih programa i HACCP sistema, od ključnog su značaja za bezbednost hrane i usmereni su na to da spreče pojavu unakrsne kontaminacije i eventualne štetne posledice po zdravlje ljudi. Međutim, ono što je potrebno prihvatiti jeste da HACCP nije samo proizvod koji neko ima ili nema. HACCP sistem je proces za čiju je implementaciju potrebno da prođe i nekoliko meseci, da bi se moglo reći da je HACCP dokumentovan, verifikovan i da sistem „živi“ u nekom objektu, odnosno da je efektivan. Kada je reč o primeni sistema upravljanja bezbednošću hrane, od velike je važnosti da osoblje, a pre svega menadžment pokaže inicijativu i volju da se uključi u sve aktivnosti, a pre svega da vrednuje značaj njegove dosledne primene. Na taj način, moguće je efikasno prevazići sve specifičnosti, odnosno barijere koje odlikuje sektor ugostiteljstva, kada je reč o primeni sistema upravljanja bezbednošću hrane.

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Review scientific paper

**HOSPITALITY – OPERATING IN ACCORDANCE WITH THE PRINCIPLES OF GOOD PRACTICE AND HAZARD ANALYSIS AND CRITICAL CONTROL POINTS****Nataša KILIBARDA<sup>1\*</sup>, Nedeljko KARABASIL<sup>2</sup>, Slaven GRBIĆ<sup>3</sup>,  
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**Abstract:**

A hospitality sector is an important place when it comes to the occurrence of foodborne diseases in the world. Restaurants within hospitality represent the last line of defense of food before it reaches the consumer. Hospitality facilities are obliged to establish a system for ensuring food safety in accordance with the principles of good manufacturing and hygiene practice and hazard analysis and critical control points (HACCP). However, the specifics of the hospitality sector often represent barriers to the successful implementation of the HACCP system. To a large extent, the successful implementation of the food safety management system can be influenced by the management of hospitality facilities. Proper management of human resources could play the most important role in the prevention of foodborne diseases in the hospitality industry. In addition, it is especially important to carefully consider the entire production process and its specifics, which should result in the application of appropriate control measures that will eliminate potential hazards or reduce them to an acceptable level. Food safety is imperative when it comes to consumer health, but also the effectiveness of the HACCP system will depend on how much a certain entity in the food business has managed to overcome all barriers that carry the specifics of the hospitality business and also motivate its employees.

**Keywords:** hospitality, specifics, barriers, HACCP**INTRODUCTION**

Foodborne disease or food poisoning is a broad term that encompasses all conditions or diseases that result from the consumption of food that is contaminated with pathogenic microorganisms and/or their toxins and parasites or contaminated with toxins that may be of natural or artificial origin. The causative agents of most foodborne diseases are pathogenic bacteria and/or their toxins or viruses (Kilibarda, 2019). Some of these hazards

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are of concern to the entire community when it comes to public health, some of these hazards are common to certain regions, i.e. underdeveloped or developing countries. However, one thing is for sure, and that is that in the age of globalization, all these hazards can spread very quickly along the food chain, regardless of borders. Therefore, it is necessary to keep in mind that foodborne diseases can be prevented and that everyone has a role in the prevention in their domain (WHO, 2015).

World organizations dealing with public health published data on the number of people suffering from foodborne diseases, although it should be emphasized that these are estimated, and not absolutely accurate numbers. The reason for this is that a significant number of cases of foodborne diseases remain unrecorded. The absence of records of these cases is a consequence of the fact that patients usually do not ask for medical help, and when they ask for it, samples are not taken for laboratory analysis. Also, due to a large number of causes, it is not possible to identify the right one. Usually, in cases when a diagnosis is established, competent institutions are not informed about it (Zanin et al., 2017; Kilibarda, 2019). The first report on the assessment of the incidence of foodborne diseases and mortality rates at the global level was made by the World Health Organization. According to their estimates, foodborne hazards were the cause of 600 million cases (that is, one in ten inhabitants) and 420 000 cases were fatal, on a global level, in 2010. As many as one-third of deaths from foodborne diseases were children (WHO, 2015).

In the United States, it is estimated that 9.4 million people get foodborne disease caused by pathogenic microorganisms and parasites each year, of which 56 000 are hospitalized and 1 300 dies (Scallan et al., 2011). Of this number, more than half of the foodborne diseases that are reported are related to eating outside the household, i.e. in restaurants (Angulo et al., 2006). In America, for many years, the largest number of cases of foodborne diseases has been recorded in restaurants (CDC, 2019).

However, unlike in America, in the European Union, there has been a trend for years that one of three foodborne diseases occurs in households, which is understandable considering that the largest percentage of meals is realized at home. In the second place, immediately behind the household in terms of frequency of foodborne diseases, there are facilities that provide food and beverage services (restaurants, bars, canteens, catering, etc) (EFSA, 2018).

Nowadays, by changing lifestyles and habits, humanity is exposed to a chronic lack of time. Due to that, people are increasingly focused on eating outside the home, i.e. in restaurants (de Andrade et al., 2019; Kilibarda, 2019). Whether it's a canteen in a work organization, or a fast-food restaurant, on a lunch break, a family lunch in a *fine dining* restaurant, food and beverage service providers become places where people are more likely to come into contact with food hazards. Today, food production is centralized and hospitality facilities can order food produced in different and distant geographical areas. In that case, if the purchased raw material contains some hazards (biological, chemical, physical), it is clear that it can be a potential source of danger for ready-to-eat meals. In addition, the occurrence

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of foodborne diseases, in this case, can be extremely serious, when we can talk about the globalization of (un)safe food (Zanin et al., 2017; Kilibarda, 2019; Nayak and Waterson, 2019; Kilibarda, 2020). Increasing the number of international trips (for work or pleasure) affects the occurrence of certain foodborne diseases, because in this way people come into contact with pathogenic microorganisms they have not encountered before, and it is known that the first contact with "new" pathogens makes a person susceptible to disease development (Alberer and Löscher, 2014). This is especially supported by the fact that most travelers are actually unaware of the risks that exist when consuming, for the first time, traditional and exotic dishes when traveling to a destination (Robertson et al., 2014; Kilibarda, 2020). It is clear that the health of guests is imperative, but the fact is that the occurrence of foodborne diseases represents a significant financial loss, which is reflected in the reduced number of guests, "poor marketing" and loss of loyalty of visitors. In addition, the occurrence of foodborne diseases affects economic development, especially tourism, agriculture, and food exports.

The supply of food through the hospitality sector makes a significant contribution to the overall supply of food at the national level, employs a large number of workers, which altogether affect the development of the local economy. The term hospitality means accommodation and food services, i.e. activities that do not include food preparation (accommodation services), but also includes activities related to the service of food and beverage for current use, which implies the existence of spaces in which the food is prepared (Al Yousuf et al., 2015). In this regard, food and beverage services are defined as activities that provide complete meals or beverages prepared for immediate use, whether in conventional (traditional) restaurants, self-service or takeaway restaurants, with or without seating (UN, 2008). Thus, the foodservice, defined in this way, represents over 60% of all entities that operate in the food industry, because it includes restaurants and food in hospitals, hotels, prisons, schools, companies, etc., and includes both institutional and commercial restaurants. Entities providing food and beverage services are represented from street salesman to restaurants that are part of large corporate chains, but most of them are represented through small businesses run by the owners themselves (Al Yousuf et al., 2015).

### **Who is responsible for production/offering safe food?**

The obligation of every producer, i.e. all those who deal with food, is to provide the market with quality food with certain nutritional and sensory properties that the consumer expects, but also hygienically correct and safe food, which will be harmless to consumer health (Kilibarda, 2019). Essentially and using common sense, it must be said that every link in the food chain, from the farm to the table, has a certain degree of responsibility when it comes to food safety. When it comes to food in restaurants, it is said that they are the last line of food defense before food reaches the consumer. The goal of the food safety management system is to identify potential hazards and identify places in the production process where they can pose a significant risk to food safety, but also places where they

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can be controlled (reduced to an acceptable level or eliminated) (Bunčić, 2009). According to the Regulation (2019), "Food business entities are obliged to establish a system for ensuring food safety in all phases of food production, processing and trade, except at the level of primary production, in each facility under their control, in accordance with the principles of good manufacturing and hygiene practice and hazard analysis and critical control points (HACCP)". Hospitality facilities that provide food and beverage services, in terms of this law are "food business entities", and are obliged to conduct regular self-checks of hygienic conditions of food preparation in accordance with the established HACCP system, i.e. Principles of hazard analysis system and critical control points. Thus, the hospitality facility ensures food safety, while at the same time guests have the opportunity to enjoy quality prepared and offered dishes (Kilibarda, 2019).

In order for the HACCP system to be implemented and conduct in an adequate manner in food business entities, it is necessary that the preconditions for good manufacturing and good hygiene practice (*Good Manufacturing Practice (GMP) and Good Hygiene Practice (GHP)*) are fully developed and implemented (Bunčić, 2009; Al Yousuf et al., 2015). The implementation of precondition programs ensures respect for general hygiene principles and adequate procedures and organization in all activities related to food. The basic elements of good manufacturing and hygiene practice, among other things, are applied through various areas, and some of them are the structure of the plant and its maintenance, i.e. in this case, the structure of restaurant food storage rooms and their cleaning and sanitation, as well as handling raw materials, from their transport, reception, preparation to storage of finished food (Kilibarda, 2019). In this sense, the prerequisite programs and HACCP are inseparable and compatible parts of one whole, i.e. food safety management.

The main goal of the HACCP system application is the production of safe food, with the most economical and efficient production, that can be realized through reducing food losses, improving quality, providing better control of raw material stocks, increasing profits, and engaging and awareness of employees in matters related to food safety.

### **Specific of food hospitality business**

When it comes to the application of the HACCP system in the hospitality and in the foodservice sector in general, problems are often encountered in practice. There are a number of specifics of these entities in relation to the food industry. Some of them are a large number of input raw materials and finished products, numerous recipes, and the complexity of ready-to-eat meals, but also mostly a small space where the production of different products takes place at the same time (Eves and Dervisi, 2005; Taylor and Forte, 2008; Garayoa et al., 2011). In addition, another specificity is the activity related to serving food; hospitality facilities produce and serve food at the same time, and there are differences between the ways of serving food (*a la carte*, buffet, or serving in hotel rooms) (Savović and Čurčić, 2008; Taylor and Forte, 2008). The long period of time that elapses from the preparation of food to its serving is a risk of food spoilage, especially in those situations when the so-called "hot chain" is not provided (keeping food warm until serving).

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Some of the specifics of hospitality when it comes to the application of HACCP, i.e. barriers to its implementation, are uneven production, poor application or insufficient application of science, poor equipment, or equipment that does not achieve or does not have the required performance (Wandolo et al., 2018), then poorly and insufficiently detailed described product, but also constant changes in the offer of food due to adaptation to the requirements of guests, but also competitiveness in the market (Savović and Curčić, 2008).

What has already been pointed out is that hospitality is represented by a large number of small companies, which operate without the support and advantages that entities that operate within large corporations have. Therefore, it can be concluded that they often have a relatively low-profit rate, which means that they have less financial resources to invest in food quality policy (Eves and Dervisi, 2005; FDA, 2006; Taylor and Forte, 2008). Therefore, problems such as lack of money, time, and knowledge related to the implementation of HACCP are often cited as the reason, as well as the cost of external consulting services to which entities are most often referred (Taylor, 2008).

The most common reasons for a significant percentage of foodborne diseases in hospitality are: raw materials from unsafe and untested sources, inadequate heat treatment of food, inadequate food storage temperature, as well as improper procedures for defrosting food, contaminated equipment, poor hygiene, and/or employee illness, improper handling of food leading to cross-contamination, sponges and cloths used in the kitchen for multiple purposes, meals prepared long before being served (due to poor planning) (Bolton and Maunsell, 2004; Bolton et al., 2008; Adesokan et al., 2015). Employees in this industry have different levels of education and different communication skills. Given that the business of the hospitality is mainly seasonal, staff changes frequently, which is one of the problems in terms of their training, and in addition, nonexistent knowledge of the language in which internal training is conducted can be an obstacle to successful training (Panisello and Quantick, 2001; Taylor and Forte, 2008; Taylor, 2008; Casolani and Del Signore, 2016). In restaurants of large hotel chains, where financial and infrastructural resources are not a problem, untrained staff and lack of training can be a weak point in the food production process, leading to an increased risk of unsafe food (Matias et al., 2013; Casolani and Del Signore, 2016). The human factor, when it comes to cross-contamination of food in hospitality, is a significant risk to food safety (McIntyre et al., 2013). Therefore, training of food handlers when it comes to the application of good hygiene practice is the most widespread strategy that effectively influences the improvement of food safety (Hislop and Shaw, 2009; Medeiros et al., 2011; Martins et al., 2012; Rossi et al., 2017; Zanin et al., 2017).

Since the staff can be a significant risk when it comes to food safety in hospitality, proper human resource management could play a key role in the prevention of foodborne diseases in hospitality (Eves and Dervisi, 2005; Bolton et al., 2008; Rossi et al., 2017). Their understanding of the activities performed to ensure safe food is essential when it comes to defining responsibilities and tasks for each employee who handles food, which includes

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organizing training for each of them (Garayoa et al., 2011). Their task is to provide both time and other resources for the education and training of employees. However, in order for these activities to be effective and efficient, managers must be qualified, competent and have the appropriate knowledge in the field of food safety, which in practice is usually not the case, since they usually rely on their work experience (Ko, 2013; Rebouças et al., 2017), which is often an obstacle to the successful implementation of food safety policy.

### **Application of the principles of good practice and hazard analysis systems and critical control points in hospitality**

The stages of food production and service in hospitality include, but are not limited to: the reception of raw materials, storage, preparation, heat treatment, refrigeration, heating, cold and hot food treatment, serving, decoration/packaging, serving, sales (Popov-Raljić and Blešić, 2012). All of these phases can potentially be spots where food contamination can occur, which can affect the safety of the finished dish. It is clear that if food is handled in accordance with good production and good hygiene practice and in accordance with the principles of the hazard analysis system and critical control points, the risk of food contamination is reduced to a minimum, which will ensure a safe finished product (Kilibarda, 2019).

As a general rule of application of the principles of good practice and hazard analysis systems and critical control points in hospitality, it is considered that prerequisite programs should be used to control hazards related to environmental conditions (facilities and structures, services, staff, plant, and equipment), and the HACCP system should be used to control hazards directly related to food processes (storage, processing and preparation process) (Bolton and Maunsell, 2004). Basically, the prerequisite programs are universal principles that focus on space, equipment, and personnel, while HACCP is specific and focuses on raw materials, production, and the finished product.

The basic elements of good manufacturing and good hygiene practice should primarily provide adequate working space (i.e. infrastructure requirements), protection of food from contamination caused by biological, chemical, and physical hazards, control of microorganism growth, and correctness of equipment, especially that equipment that should provide appropriate temperature conditions in which food is stored (refrigerators, freezers), in which food is thermally processed (ovens) or in which it is served and displayed (warm cabinets and tables). Also, prerequisite programs in hospitality can include allergen management, order specification, development of detailed recipes, staff training programs, as well as standard operating procedures related to cleaning and sanitation of equipment and space (FDA, 2006).

Implementation of prerequisite programs, which are related to the structure of space, i.e. infrastructure requirements, space, and premises, can often be a problem for small businesses, which cannot be said when it comes to large corporate chains and restaurants and/or hotels franchises. In hospitality, taking into account the specifics, the problem is the

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simultaneous preparation of different types of dishes and the serving process, and often the problem is to provide a special space for storage, processing, and preparation of food, or to separate these activities in time. This can be a significant risk for cross-contamination in hospitality. Also, poor staff hygiene, insufficient staff training, and lack of awareness of employees about food safety in hospitality, given its specifics, can be a significant risk when it comes to food safety in hospitality (Martins et al., 2012; Serafim et al., 2018), given that most foodborne diseases in hospitality occur as a consequence of inadequate food handling (Zanin et al., 2017; Barjaktarović-Labović et al., 2018).

After the establishment of prerequisite programs, the introduction of HACCP is implemented through twelve steps, i.e. through five steps and seven principles 1. training and formation of a team for HACCP; 2. detailed product description; 3. description of the purpose of the product and identification of food users; 4. making flow diagrams of the production process; verification of the flow diagram of the production process on-site, while the seven principles include: Principle 1. Risk analysis, which is the basis for the development of the HACCP plan and the basis for defining all further steps; Principle 2. Determination of critical control points - a step in the production process in which control is applied in order to eliminate the hazard or reduce that hazard to an acceptable level; Principle 3. Determination of critical limits, i.e. minimum and maximum values for each control point, for biological, chemical, and physical hazards; Principle 4. Establishment of a system for monitoring, i.e. monitoring critical points; Principle 5. Defining and implementing corrective measures; Principle 6. Verification of system functioning and Principle 7. Establishment of HACCP system documentation (Bunčić, 2009).

Although the Regulation (2019) request that "a food business operator is obliged to have a permanently responsible person with appropriate education for the implementation of good manufacturing and hygiene practices and the application of HACCP" in hospitality facilities, this represents a potential place for concern. It often happens that the owners of the facility are also managers, who are not qualified and do not have the appropriate level of education. Consequently, they rely on their experience or managerial skills in activities related to food safety. Small facilities are not able to appoint a HACCP team due to insufficient staff and are therefore focused on hiring external consultants. Such services generally represent financial costs that are not justified for them, as it is often the case that management does not value the importance of food safety sufficiently (they give preference to the ambiance, taste, and presentation of food, attractive location) (Taylor, 2008; Wallace et al., 2018).

A detailed description of each ready-to-eat meal, but also making a flow chart of each prepared product is a big job, especially for restaurants that have a wide range of dishes. Due to a large number of combinations of production processes, processing, preparation, and serving of food, in hospitality, it is recommended to group production processes in relation to the same activities during the preparation and serving of food. Thus, observing the production processes in this way there is no approach to each dish separately and

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consequently, both time and resources can be saved. It is clear that although there are differences in the production processes of different dishes classified in this way, it can be generally said that the control measures applied to eliminate or reduce hazards will be the same in each process and will be based on how many times food passes through the danger zone. A danger zone means a temperature zone between 5°C and 60°C. This is the temperature range that is most conducive to the growth and multiplication of bacteria (FDA, 2006). There are three groups of production processes that are based on how many times food passes through the danger zone (FDA, 2001). The first group of production processes includes the following phases: reception - preparation - serving (without heat treatment). The first production process includes raw dishes such as sushi, sashimi, fresh shellfish and salads, and other ready-to-eat foods such as cheeses, then pasteurized milk products (sour cream, yogurt), etc. The second group of production processes includes reception - preparation - heat treatment - food display - serving (food passes once through the danger zone). This production process is applied for the preparation of, for example, grilled chicken, which is served hot immediately after heat treatment. The third group of production processes includes the following phases: reception - preparation - heat treatment - cooling - heating - hot storage - serving (food passes through the danger zone several times). Examples would be complex dishes such as dishes that are prepared in larger quantities and stored for serving the next day (soups, stews, etc.) (Seward, 2000; FDA, 2001).

Also, the grouping of dishes can be done in relation to the method of preparation in several groups, such as heat treatment of food/hot serving; heat treatment of food/cold serving; cold food preparation/cold serving and in relation to the method of serving (Popov-Raljić and Blešić, 2012).

Basically, no matter which grouping method is applied, it is important to make the job easier, as well as to relieve the system of documentation. The goal of this grouping of dishes is that, regardless of the variety of finished products, the applied control measures can be the same. Thus, for example, a certain restaurant can prepare dozens of dishes, which are produced by the same production process, that is, for example, dishes pass through the danger zone once. Each of these dishes can be a source of different dangers, but the control measure, i.e. adequate heat treatment, eliminates or reduces all these hazards to an acceptable level. For example, *Salmonella* and *Campylobacter* are important biological hazards for grilled chicken, while *Salmonella*, *E. coli O157: H7*, *Bacillus cereus*, and *Clostridium perfringens* are important biological hazards for minced meat roll, however, the control measure, which is heat treatment, will for both dishes be the same. Additionally, if these dishes are not served immediately, their proper warm storage over a period of time may also be the same control measure, which will prevent the growth and production of toxins of sporulating microorganisms, which have survived the heat treatment process (Bolton and Maunsell, 2004; FDA, 2006).

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### Potential critical control and control points in the production process in the hospitality

When establishing critical control and control points, entities that prepare and serve food should always take into account their own needs, i.e. they should be in accordance with the size and type of facility, production capacity, and type of production process, the properties of raw materials and finished products which they prepare, so that the system does not overload the production process itself, losing its purpose (Wallace et al., 2018).

Some examples of critical control points in hospitality could be:

*Receipt of raw materials.* Receipt of raw materials is an important stage in the process of food production in hospitality. At admission, the risk may be a raw material contaminated with pathogenic bacteria and/or their toxins. First of all, it is important for that reason that the procurement of raw materials is done exclusively from verified suppliers. At this stage, the application of two types of control measures is recommended. Raw materials that require a temperature regime should be stored in a cold chain mode immediately upon receipt. Special care should be taken at the reception when it comes to ready-to-eat food, but also food that will not be thermally processed before serving. A control measure that would ensure temperature monitoring at the reception of such raw materials, would be an adequate measure to control the presence of danger in such food. It is especially important to apply this measure when it comes to the intake of certain species of marine fish, due to the possibility of the appearance of scromboid toxin, i.e. histamine. Also, at the reception of fish that is intended to be consumed raw, and originates from a climate where there is a risk of the appearance of certain pathogenic parasites in it, it is very important to freeze it immediately. Some of the control measures could be the verification of declarations of conformity of raw materials issued by accredited laboratories, then visual control of raw materials, shelf life, packaging integrity and cleanliness, and hygiene of the transport vehicle (FDA, 2006; Bolton and Maunsell, 2004).

*Storage.* When food is stored cold in the refrigerator before preparation, the food safety system should be focused on providing a temperature that will prevent the growth and multiplication of pathogenic microorganisms in the food, which is especially important for ready-to-eat products. It is also important to take care that food is stored in a way to prevent cross-contamination (food must be covered, it is necessary to store raw and heat-treated food separately, etc.), and then to allow air circulation in the refrigeration unit itself. Storing food in a frozen state, in freezers, at temperatures below -12°C can also be considered as a potential critical control point. These temperatures prevent the growth, reproduction, and production of bacterial toxins, which is why it is important to provide and control the required temperature regime and store food in an adequate way to avoid cross-contamination (Bolton and Maunsell, 2004; FDA, 2006).

*Defrosting of raw materials.* Frozen food should be thawed in refrigerators or only if necessary in a microwave oven using an appropriate program. It is important to mention

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that thawing at room temperature can allow bacteria to multiply and produce toxins if they are given enough time in addition to the optimal room temperature.

*Food preparation.* This phase in the process of food production includes a large number of activities that need to be supervised and controlled. Food preparation includes various processes such as combining different ingredients, chopping, grinding, kneading, etc. At this stage, it is important to develop procedures that will minimize the possibility of growth of microorganisms and food contamination by employees and/or equipment (Pop Raljić and Blešić, 2012). To prevent the growth of microorganisms, it is important to take care that the food is kept at ambient temperature for as little time as possible, i.e. in the danger zone. This can be achieved by preparing food in smaller quantities, which also means less time spent preparing. However, this is also a problem in hospitality since food preparation is unpredictable due to the nature of the business (except when it comes to restaurants with menus) (Kilibarda, 2020). To prevent cross-contamination of food by employees and equipment, utensils, and dishes in the food preparation phase, it is necessary to have implemented procedures related to employee hygiene and their behavior in the food area as well as a well-defined plan for cleaning and disinfection of surfaces, space, and equipment, and the separation of incompatible activities spatially and/or timely (Tešanović, 2017).

*Thermic processing.* Heat treatment of food of animal origin is the most efficient procedure used to eliminate or reduce biological hazards in ready-to-eat meals. Therefore, it is recommended to frequently monitor the heat treatment temperature and the time required to reach a certain critical value. Literature data suggest that the temperature in the center of the product should be at least 70°C for at least two minutes or reach at least 75°C in the food center. These temperatures are sufficient to destroy pathogenic bacteria such as *Salmonella*, *Campylobacter*, *L. monocytogenes*, and *Y. enterocolitica*. Lower heat treatment temperatures are allowed, but only for the preparation of special dishes or the preparation of dishes by certain techniques such as the *sous vide* food preparation technique (Kilibarda et al., 2018). However, in a production process, such as hospitality, it is almost unreasonable to measure the temperature of each hamburger in one entity that produces, for example, hundreds of hamburgers. In this case, it would be reasonable to confirm during routine work whether the heat treatment process itself and the equipment used can reach the required temperature in the product and/or in the equipment itself. Once it is determined whether the process itself meets the satisfactory criteria, the frequency of temperature measurements can be reduced. However, it is especially important to establish adequate critical limits during the heat treatment process, especially if it is the food of animal origin (Bolton and Maunsell, 2004).

*Cooling of heat-treated food.* Heat-treated food should be cooled immediately after the end of heat treatment using blast chiller equipment. If such a device is not available, the dish should be placed in the refrigerator within 90 minutes from the end of the processing process. The equipment should be able to lower the temperature in the center of the dish to

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10°C within 150 minutes. Prolonged cooling of food (longer than six hours) can lead to the creation of conditions in food that allow the growth of sporogenic bacteria, which have survived heat treatment and in such conditions can germinate and produce toxins. Since toxins are thermostable, a later phase in the process of food preparation, i.e. heating, will not lead to their elimination (Kilibarda, 2019).

*Reheating.* When heating food, that has previously been heat-treated and cooled, it has to reach a temperature of at least 73°C in the center of the product. Immediately after reheating the food, the food must be served within 30 minutes. The temperature of reheated food, if exposed to a hot table, must not fall below 65°C. These set temperatures must be controlled (Bolton and Maunsell, 2004; Kilibarda, 2019).

*Storing food during serving.* Food in restaurants can be exposed for sale in different ways (in the form of cold or hot buffet tables, cutting carts, dessert carts, display cases) and it is clear that in this way it is exposed to additional risks (Popov-Raljić and Blešić, 2012). Therefore, this phase can be considered a critical point and therefore must be controlled. Prevention of bacterial growth and reproduction can be ensured by limiting the time period in which food is exposed (this time should be shorter than what is needed to significantly increase the number of bacteria), or by storing food at temperatures that prevent bacterial growth (outside the danger zone). Heat-treated ready-to-eat food that is stored in a warm place must be at a temperature higher than 65°C, which can be achieved by exposing the food on a hot table (heat maintenance devices), and with a limited exposure time of a maximum of two hours. Lack of control over the established critical limits (temperature and/or time) could lead to the creation of conditions for the growth of pathogenic bacteria such as *S. aureus*, *C. perfringens*, and *B. cereus*. When it comes to cold food serving, food is allowed to be exposed during serving for a maximum of two hours after it has been removed from the refrigeration appliance (on refrigerated counters for up to four hours) (Bolton and Maunsell, 2004; FDA, 2006).

*Serving food.* Serving food is the last activity before the food reaches the consumer. In this phase of the food production process in hospitality, it is of great importance to prevent the possibility of cross-contamination of food by employees, which is achieved by maintaining personal hygiene of employees, their training and education, and developing awareness of responsibility for food safety. A specificity in hospitality is the hotel serving food in rooms, where additional risks may occur as the length of time of food transfer from portioning in the kitchen to delivery to the room, inadequate temperatures at which food is stored, inadequate food protection during delivery, etc. (Savović and Čurčić, 2008; Tešanović, 2017).

## CONCLUSION

Consistent application of prerequisite programs and HACCP systems are crucial for food safety and are aimed to prevent the occurrence of cross-contamination and possible harmful consequences for human health. However, what needs to be accepted is that HACCP is not

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just a product that someone has or does not have. The HACCP system is a process that takes several months to implement, in order to be able to say that the HACCP is documented, verified and that the system "lives" in a facility, i.e. that it is effective. When it comes to the application of the food safety management system, it is of great importance that the staff, and above all the management, show initiative and will to get involved in all activities, and above all to evaluate the importance of its consistent application. In this way, it is possible to effectively overcome all the specifics, i.e. barriers that characterize the hospitality sector, when it comes to the application of food safety management systems.

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