Managers' opinions of factors influencing HACCP applications in Italian hotel/restaurant/café (HoReCa) sector

1. Introduction

The first mention of the term HACCP in EU legislation was made by the European Directive 93/43/EC in 1993, implemented in Italy by Legislative Decree No.155/1997, the first regulatory tool for HACCP regulation in this Country. Regulation (EC) No. 852/2004 requires that food business operators implement and maintain a permanent control procedure based on HACCP principles. In order to conform with European regulations No. 178/2002, No. 852, 853, 854, 882/2004 that governing Food Hygiene and HACCP, the Italian legislature repealed Legislative Decree no. 155/97 and enacted Legislative Decree 193/07. The Council of the European Union adopted, by means of directives, minimum requirements for encouraging improvements to guarantee Food Safety and then individual Member States were asked to improve on those minimum requirements (Matias *et al.,* 2013).

HACCP is a system that identifies, evaluates and controls hazards that are significant for Food Safety (*Codex Alimentarius*, 2009). Control of the hazards can be ensured by applying physical and/or chemical and/or microbiological treatments (Cerf and Donnat, 2011; Sun and Ockerman, 2005).

Panisello *et al*. (1999) point out some factors that may threaten the efficiency of HACCP: the missed hazard principle (hazards are not perceived, therefore they are not controlled), the missed risk principle (hazards are perceived, but risks are not considered) and the missed prevention principle (hazards and risks are identified but an adequate understanding of the unperformed process control measure is lacking). However, the difficulties in HACCP application vary from country to country and from food business sector to food business sector (Sözen and Hecer, 2013). In fact, every food activity (industry, catering, primary production, etc.) presents risks, depending on its nature (Panisiello and Quantick, 2011); the Hotel/Restaurant/Café (HoReCa) sector – and catering services in general – presents several hazard situations (Beumer *et al*., 1994; Lambiri *et al*., 1995; Sun and Ockerman, 2005; Bolton *et al*., 2008; Garayoa *et al*., 2011).

In Food management, Managers with a thorough knowledge of Food Safety issues and positive attitude toward food safety have a competitive advantage over others (Coleman *et al*., 2000).

Dzwolak (2014) analyzed the difficulties of small organizations in applying HACCP; his list includes limited human, financial and technical resources; in addition there are a number of studies that focus on the particular difficulties encountered in HACCP management in the various food sectors. Martins *et al*. (2012) studied Food Hygiene knowledge of professional food handlers in an institutional catering company in Portugal using a multiple-choice questionnaire, aimed at exploring the Food Safety knowledge and practices of individual respondents; they found that the level of knowledge was influenced by the level of formal education. In a similar study, Bánáti and Lakner (2012) used a survey

to analyze the opinions of Hungarian catering service Managers towards Food Hygiene and the HACCP system. Trafialek *et al*. (2015) also used a questionnaire to survey 66 businesses and discovered that there were some misunderstandings in how the HACCP system is applied and a scarce ability of the surveyed businesses to implement HACCP principles without external support. The lack of skilled labor in the catering sector and the lack of training, both in terms of occupational health and safety standards for workers and in terms of Food Safety, is a deficiency that leads to an increased risk for both systems (Matias *et al*. 2013). Shih and Wang (2011) investigated factors which may potentially influence implementation of the HACCP system in hospital catering in Taiwan; the results show that differences in gender, age, and job position are factors that may influence HACCP implementation, which accords with Melngaile (2011) who analyzed implementation of Food Safety Legislation in Catering Establishments in Latvia. Furthermore, Bas *et al*. (2006), using face to face interviews and administrating questionnaire in Ankara (Turkey), analyzed HACCP in hospital food services, catering establishments, school food services, hotels, kebab houses, takeaways and restaurants; their results indicated that proper Food Safety practices and prerequisite Food Safety programs were often not being followed in these Food Businesses.

European Regulations 852/04 and 178/02 make it mandatory for all Managers of Companies engaged in the production, trade, handling and placement of food and beverages to take a course in food safety.

Italian Regions regulate these courses through Regional Law; in addition Bertoldi and Galli have found that numerous training courses on food safety have been organized by both private and public institutions (Bertoldi and Galli, 2009).

The goal of this paper is to analyze the opinions of HoReCa Managers of factors that influence the application of HACCP in the Re/Ho[1] and the Bar[2] and then compare the results of the two sectors. In addition we investigated how these two business sectors interface with the Public Food Safety Control system.

2. Materials and methods

2.1 Questionnaire

The questionnaire consists of three main sections (table 1); the first regards general HACCP Management features in the HoReCa channel, and was prepared after a consultation of specific scientific literature (Panisello *et al*., 1999; Walker and Jones 2002; Youn and Sneed, 2003; Worsfold

[1] For Re/Ho were intended Restaurants and Hotels with Restaurants service inside and, consequently, that are obliged to respect HACCP system. By Re/Ho we mean Restaurants and Hotels with Restaurant service inside, consequently, businesses that are obliged to comply with the HACCP system.

[2] Coffee Shops or Cafés were assimilated to Bars.

and Griffith, 2003; Taylor and Kane, 2005; Bas *et al*., 2007; Shih and Wang, 2011; Gamza-Michalowska *et al*., 2011).

The aim of the second section was to find the main difficulties as perceived by HoReCa Managers, so it consists of a list of statements with which the respondent must either agree or disagree (Coleman *et al*., 2000; Youn and Sneed 2003; Taylor and Kane, 2005; Bas *et al*., 2007; Damikouka *et al*., 2007; Isara *et al*., 2010; Gamza-Michalowska *et al*., 2011; Garayo *et al*., 2011; Shih and Wang, 2011; Garayoa *et al.*, 2011; Martins *et al*., 2012; Bánáti and Lakner, 2012; Trafialek *et al.*, 2015).

The third section focuses on the relations between HoReCa Managers and the Public Food Control .system (PFCs) that includes a long list of various Authorities that control Food Safety in Italy and which are indicated in Italian Legislative Decree 300/1999.

The completed questionnaires were received from November 2014 to March 2015.

Before its official distribution the questionnaire was administrated to 30 HoReCa Managers to identify possible errors of interpretation, superfluous or inappropriate questions and to get respondents' critical feedback.

A Likert scale from 1 to 7 (1=strongly disagree; 2=disagree; 3=slightly disagree; 4=neither agree nor disagree; 5=Slightly agree; 6=agree; 7=totally agree) was the form used to express agreement/disagreement with a statement (Casolani *et al*., 2015).

Table 1
List of statements in questionnaire.

Topic	Statements
SECTION A	A1. I consider my activities at high risk for Food Safety.
	A2. The requirements of a HACCP system are easily achievable.
General HACCP	A3. Regulatory aspects of law are easy to understand.
management statements	A4. Public Authorities provide excellent explanations when they are questioned about HACCP.
	A5. The costs of HACCP are easily manageable for my business.
	A6. The benefits of HACCP are significantly higher than costs.
	A7. The technical aspects of HACCP are easy to understand.
	A8. I feel protected by HACCP application.
	A9. The HACCP system is not necessary if you have high Hygiene standards.
	A10. HACCP ensures Food Safety.
	A11. Obligatory training course are sufficient to manage HACCP.
SECTION B	A12. Identifying risks and hazards in food.
	A13. Developing an HACCP plan.
Technical statements	A14. Updating legislative aspects.
linked to HACCP.	A15. Identifying Critical Control Points.
Each statement ends with	A16. Monitoring and verification of Critical Control Points.
“represent a limit in	A17. Monitoring of suppliers.
HACCP management”.	A18. Cleaning and disinfection of the premises.

	A19. Staff Hygiene. A20. Regulating activities of suppliers A21. High turnover of staff. A22. Applying of Good Hygiene Practices (GHP).
SECTION C Relation with Food Public Control systems (FPCs)	A23. Food Public Control systems are very useful to protecting consumers. A24. Food Public Control systems are very meticulous. A25. Food Public Control systems provide elements to continuously improve HACCP. A26. I trust Food Public Control systems. A27. Food Public Control systems have increased my awareness of the importance of HACCP.

2.2 Data collection

934 Italian HoReCa Managers' were requested to fill out a survey, obtaining 420 completed questionnaires. The Socio-demographic profile of those interviewed is shown in Table 2.

The questionnaire was distributed through the following methods:

-personal interview face-to-face (35% of total respondents; three different Italian cities were randomly selected: Pescara, Bologna and Rome). 160 persons participated (response rate=72%);

-phone interview (40% of total respondents); after a random selection using telephone directories, 240 activities were contacted (response rate=70%);

-email (25% of total respondents); the questionnaire was sent by e-mail to 534 randomly chosen Italian food businesses (Re/Ho and Bars) of those contacted 105 returned completed questionnaires (response rate=20%).

Table 2

Composition of respondents (Managers of Re/Ho and Bar).

		Restaurants/Hotels (n = 280)	Bars (n = 140)
Gender	Male	88.0%	84.6%
	Female	12.0%	15.4%
Age	18-35	11.5%	8.0%
	36-45	45.9%	24.0%
	46-55	16.4%	48.0%
	56+	26.2%	20.0%
Education	Post-high-school	8.1%	6.8%
	High school or lower	91.9%	93.2%
Number of employees	Less than 5	5.0%	85.7%
	From 5 to 8	25.0%	8.6%

More than 8	70.0%	5.7%

2.3 Data analysis

Results were analyzed using the Statistical Package for the Social Sciences (SPSS) 21.0 program. Test of variance (t tests when the variables were two) were performed to compare results of Re/Ho and Bar including variables such as gender, age, education of Managers and number of employees of Food Business. Only statistically significant differences have been taken into consideration ($p<0.05$).

3. Results

3.1 Managers' opinions about HACCP management

Table 3 contains the results of different statements proposed to interviewees regarding HACCP management. Statistically significant differences between Re/Ho and Bar Managers' opinion were found for assertions A4 (Public Authorities provide excellent explanations when they are questioned about HACCP; μRe/Ho= 3.26; μBar= 3.23; $p<0.05$) and A8 (I feel protected by HACCP application; μRe/Ho= 4.69; μBar= 4.54).

The statements with highest level of agreement are A6 (the Benefits of HACCP are significantly higher than costs; μRe/Ho= 5.23; μBar=5.00) and A7 (Technical aspects of HACCP are easy to understand; μRe/Ho= 5.15; μBar= 4.77). Instead, the highest level of disagreement are for assertions A1 (I consider my activities at high risk for Food Safety; μRe/Ho= 2.7; μBar= 2.96) and A9 (HACCP system is not necessary if you have high Hygiene standards; μRe/Ho= 2.89; μBar= 2.92).

Table 3

Statements proposed to respondents regarding general aspects of HACCP management (Likert scale: 1 = strongly disagree; 2 = disagree; 3 = slightly disagree; 4 = neither agree nor disagree; 5 = Slightly agree; 6 = agree; 7 = totally agree).

	Restaurants/Hotels (n = 280)		Bars (n = 140)		F
	Mean	Stand. Dev.	Mean	Stand. Dev.	
A1. I consider my activities at high risk for Food Safety.	2.70	1.22	2.96	0.66	15.35
A2. The requirements of an HACCP system are easily achievable.	4.80	0.70	4.50	0.91	6.03
A3. Regulatory aspects of law are easy to understand.	4.23	1.13	3.50	0.99	1.21

A4. Public Authorities provide excellent explanations when they are questioned about HACCP. **	3.26	1.08	3.23	0.86	1.11
A5. The costs of HACCP are easily manageable for my business.	4.68	0.89	4.58	0.90	0.32
A6. The benefits of HACCP are significantly higher than costs.	5.23	0.88	5.00	0.69	2.69
A7. The technical aspects of HACCP are easy to understand.	5.15	0.57	4.77	0.82	2.37
A8. I feel protected by HACCP application.*	4.69	0.98	4.54	0.99	0.44
A9. HACCP system is not necessary if you have high Hygiene standards.	2.89	1.61	2.92	1.32	1.16
A10. HACCP ensures Food Safety.	4.95	1.06	4.77	1.07	0.30
A11. Obligatory training courses are sufficient to manage HACCP[3].	2.95	1.02	2.88	0.92	2.32

* statistically different for $p<0.05$ between Re/Ho and Bar; ** statistically different for $p<0.01$ between Re/Ho and Bar.

Table 4 contains the results of value assigned to statements proposed as the main difficulties in HACCP management. Statement A21 (The high turnover of staff; μRe/H= 6.18; μBar= 6.68) and statement A22 (Application of Good Hygiene Practices - GHP; μRe/Ho= 6.81; μBar= 6.71) are the greatest difficulties perceived by HoReCa Managers'. Statistical differences were observed for statements A18 (Cleaning and disinfection of the premises; μRe/Ho= 3.08; μBar= 3.58; F=0.84) and A19 (Staff Hygiene; μRe/Ho= 3.11; μBar= 3.81; F=2.29).

Table 4
Statements proposed as difficulties in HACCP management. Each statement ends with the sentence "Represent a limit in HACCP management". (Likert scale: 1 = strongly disagree; 2 = disagree; 3 = slightly disagree; 4 = neither agree nor disagree; 5 = Slightly agree; 6 = agree; 7 = totally agree). t test was applied to compare Re/Ho and Bars results.

	Restaurants/Hotels (n = 280)		Bars (n = 140)		F
	Mean	Stand. Dev.	Mean	Stand. Dev.	
A12. Identifying risks and hazards in food.	5.38	1.25	5.5	1.56	3.70
A13. Developing an HACCP plan.	6.10	1.45	5.92	1.85	1.96
A14. Updating legislative aspects.	5.95	1.42	5.81	1.50	0.00
A15. Identification of Critical Control Points	5.92	1.34	5.73	1.69	1.46

[3] Obligatory training means attendance at the legally mandatory course required by European Regulations 852/04 and 178/02.

A16. Monitoring and verification of Critical Control Points.	6.03	1.37	5.85	1.74	1.73
A17. Monitoring of suppliers.	5.30	1.28	5.58	1.47	0.18
A18. Cleaning and disinfection of premises.*	3.08	0.99	3.58	1.10	0.84
A19. Staff Hygiene.**	3.11	0.98	3.81	1.23	2.29
A20. Regulating activities of suppliers.	5.72	1.32	5.23	1.50	2.73
A21. High turnover of staff.	6.18	0.81	6.68	0.86	0.05
A22. Application of Good Hygiene Practices (GHP).	6.81	1.32	6.71	0.62	1.22

* Statistically different for $p<0.05$; ** statistically different for $p<0.01$.

3.2 Factors influencing HACCP application

A test of variances related to the socio-demographic variables of the HoReCa Managers (Table 2) was applied to the statements in Tables 3 and 4. The level of education of Re/Ho Managers is the unique variable that determines significant differences among statements. Re/Ho Managers with post-high school education assigned to statements A1 (I consider my activities at high risk for Food Safety), A9 (HACCP system is not necessary if you have high Hygiene standards) and A11 (Training course are sufficient to manage HACCP) a value of agreement statistically higher than Re/Ho Managers who had a high school education or lowed (Table 5); conversely, the value assigned by this group to statements A12 (Identify risks and hazards in food), A13 (Develop an HACCP plan), A14 (Update legislative aspects) and A15 (Identification of Critical Control Points) was statistically lower.

Table 5

t test applied to statements A1-22 based on education of Managers in Re/Ho channel (only the statistically significant results are shown).

	Managers Level of Education: Post-high-school	Managers Level of Education: High school or lower	F
A1. I consider my activities at high risk for Food Safety.**	4.62	2.53	2.26
A9. HACCP system is not necessary if you have high Hygiene standards.**	4.40	2.76	4.88
A11. Obligatory training course are sufficient to manage HACCP.*	4.79	2.79	1.12
A12. Identify risks and hazards in food.*	6.45	5.29	1.38
A13. Develop an HACCP plan.*	6.71	6.05	1.32

A14. Update legislative aspects.**	6.76	5.88	2.34
A15. Identification of Critical Control Points.**	6.61	5.86	4.84

*p<0.05; **p<0.01.

The variable "Number of employees" determined significant differences for the following statements: A18 (Cleaning and disinfection of the premises), A19 (Staff Hygiene) and A21 (High turnover of staff). Bar Managers' with fewer than 5 employees assigned higher value to the previous statements (Table 6). Fletcher et al. (2009) indicated that the staff's knowledge of Food Hygiene is perhaps influenced by the dimension of the particular Food Business.

Table 6
Analysis of variance of statement that statistically differs in Bar systems based on number of employees (only the statistically significant results are shown).

	Fewer than 5 employees	From 5 to 8 employees	More than 8 employees	F
A18. Cleaning and disinfection of premises.*	3,79[a]	2,41[b]	2,13[b]	3.26
A19. Staff Hygiene.**	4.01[a]	2.72[b]	2.41[b]	2.68
A21. High turnover of staff.**	6.80[a]	6.00[b]	5.90[b]	1.82

*p<0.05; **p<0.01. Use of a different letter indicates a statistical difference.

3.3 Relations between HoReCa Managers and the Food Public Control System

Results assigned to statements in relations to FPCs are reported in Table 7; the highest level of agreement is for the statement A23 (Food Public Control systems are very useful for protecting consumers); HoReCa Managers also express their strong agreement for the other statements.

Table 7
Statements about the opinions of HoReCa Managers about "Food Public Control" (n = 420). (Likert scale: 1 = strongly disagree; 2 = disagree; 3 = slightly disagree; 4 = neither agree nor disagree; 5 = slightly agree; 6 = agree; 7 = totally agree).

	Mean	St. Dev.
A23. Food Public Control systems are very useful for protecting consumers.	6.45	1.04
A24. Food Public Control systems are very meticulous.	5.95	1.35
A25. Food Public Control systems provide features that continuously improve HACCP.	6.41	1.23
A26. I trust Food Public Control systems.	5.35	1.17
A27. Food Public Control systems have increased my awareness of HACCP.	6.16	1.15

4. Discussion

4.1 HACCP management and main difficulties

The results have shown a number of interesting points. HoReCa Managers disagree with the idea that HACCP system is not necessary if you want to have high Hygiene standards but they also disagree with the idea that their activity is at high risk for Food Safety; this result suggest that Managers might underestimate some dangerous situations related to Food Safety in their activities; Matias *et al*. (2013) indicate cleaning and Hygiene associated with catering as fundamental tools for HACCP success, because kitchens are potentially places where cross contamination may occur (Clayton and Griffith, 2004; Redmond and Griffith, 2004).

HoReCa Managers feel that their Food Business is protected by HACCP application; moreover HoReCa Managers consider the regulatory provisions of the law to be easily understandable. However on the occasions when they asked public authorities for clarification on some aspect of HACCP, the authorities were not able to provide adequate clarification.

Another noteworthy result is that HACCP costs are perceived as easily manageable for HoReCa businesses, which contrasts with perceptions in the Food Industry, where the cost is one of the common barriers hindering HACCP implementation (Clayton *et al*., 2002; Hwang *et al*., 2001; Mortimore, 2001; Panisello and Quantick, 1999). Furthermore, the benefits perceived by HoReCa Managers as the result of HACCP application were considered significantly higher than the costs of implementation.

HoReCa Managers consider the obligatory training courses inadequate for the management of HACCP; training has been shown to improve food safety knowledge and awareness of hygiene and to potentially improve food safety practices (Thompson *et al.*, 2005). Respondents expressed slight disagreement with the statement that staff Hygiene, cleaning and disinfection of the premises are difficulties in their HACCP management. However, the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO) recommend that food handlers should receive training before starting work in any food establishment, and should have periodic refresher training courses thereafter (Isara *et al*., 2010).

The following activities in the technical management of HACCP were perceived as constituting significant limitations on effective implementation: application of Good Hygiene Practices (GHP), high turnover of their workers staff, development an HACCP plan, identification, monitoring and verification of Critical Control Points, and keeping updated on modifications to the relevant legislation. Application of HACCP has been demonstrated to be efficient in Companies that already followed GHP (Eves and Dervisi, 2005). The proper identification of Critical Control Point is a key issue in HACCP success (Damikouka *et al*., 2007). These results lead us to conclude that HoReCa Managers are not able to manage their HACCP systems autonomously. Furthermore, for a successful implementation and effective functioning of an HACCP system, knowledge of the hazards inherent the

infrastructures, tools and human resources involved is necessary (Matias *et al*., 2013). In fact, Efstratiadis and Arvanitoyannis (2000) argue that HACCP should be a part of the total quality control system, because such systems encourage training and further education of personnel under certain procedures and create an environment of cooperation between the management and the personnel.

HoReCa Managers' considered the high turnover of their work staff as a great hurdle to HACCP application; high turnover of staff is highlighted as one of the most common barriers in food businesses also in other studies (Bas et al., 2007; Panisello and Quantick 2001), because employees need time and training in order to fully comprehend HACCP system and to acquire experience in collecting applying it. Taylor (2001) considers that the most important factor affecting the implementation of the system is the technical qualification of the staff and their experience; the efficiency of an HACCP system depends on the competency of the people who both develop and then operate (Mortimore, 2001; Rodgers, 2007). The lack of training and skilled labor in the catering sector is a weak point that leads to an increased Food Safety risk (Matias *et al.,* 2013).

Managers, supervisors, and operators all have important roles to play in HACCP system implementation (Ko, 2013).

4.2 Factors influencing HACCP application

As has been observed in section 3.2, the level of education of Re/Ho Managers impacts their perception of some aspects of HACCP management. Re/Ho Managers with post high school education, compared with those that have a high school or lower education, have a stronger perception of the high Food Safety risks inherent their activities, but they also believe that an HACCP system is not necessary if you have high Hygiene standards and believe that your training course is sufficient to manage HACCP.

Other aspects of HACCP management where the Managers' level of education impacts their perception of the difficulty are: identification of risks and hazards in food, the development of an HACCP plan, identification of critical control points and keeping updated on changes in relevant legislation. Managers with a post high school education or higher strongly agree that these aspects of management constitute difficulties, while Managers with a lower level of education express less agreement that these aspects constitute difficulties.

Managers perception of the importance of "Cleaning and disinfection of the premises", "Staff Hygiene" and "High turnover of staff" in HACCP management are influenced by number of employees in the business. In fact, Managers' of Bars with more than 8 employees and between 5 to 8, as compared to those with fewer than 5 employees, agree less about "Cleaning and disinfection of the premises", "Staff Hygiene" and "High turnover of staff" being a limitation on effective HACCP application. The general role of hand washing in preventing disease is well known in the catering industry (Angelillo *et al.*, 2000).

4.3 Food Public Control system

The relationship between HoReCa Managers and the Food Public Control system brings up a variety of interesting points. Firstly, respondents trust in the Food Public Control system. Moreover, they believe that it can increase their awareness of the importance of HACCP and they perceive the control phase as a training opportunity. In terms of efficiency, the Public Control system is considered very useful in protecting consumers and in providing elements for the continuous improvement of HACCP; the opinions of the Managers accord with the findings of Panisello and Quantick (2001) that controls and external pressure, may improve the efficiency of HACCP in Food Business.

5. Conclusions

The HoReCa system presents a number of risk situations concerning Food Safety; while many studies have been carried out with the object of understanding the type of risk associated with each Food Business or operation, few studies are focused on the needs, the difficulties and the opinions of those who actually manage HACCP systems. The present study moves in this direction, with an investigation of Managers' opinions of HACCP applications in the HoReCa channel. Some interesting points have emerged from this research. Firstly, HACCP costs are considered by HoReCa Managers as easily manageable; moreover they recognize the HACCP system as a fundamental tool for achieving high Hygiene standards. Another point that emerges from this research is that regulatory aspects of law on HACCP are considered by HoReCa Managers as easy to understand. Staff Hygiene, cleaning and disinfection of the premises are not considered difficulties in HACCP management, in contrast with the technical aspects like the identification, monitoring and verification of Critical Control Points. HoReCa Managers believe that application of Good Hygiene Practices (GHP) is the greatest difficulty of HACCP management.

In Re/Ho system the Managers' level of instruction influences the perception of difficulties in some practices related to HACCP application, like identification of risks and hazards in food, development of HACCP plan, identification of Critical Control Points and also keeping updated on the relevant legislation; in fact Managers with a high school or higher level of education strongly agreed that these practices represent a difficulty in HACCP management.

In addition it was found that Respondents believe Public Control with regards to HACCP application to be very meticulous and this increases their awareness of the importance of HACCP. Obligatory training courses are not considered sufficient to manage HACCP. Clearly, improving HoReCa Managers knowledge through training is extremely important and training activities should be planned after taking into account the feedback provided by those who actually work in the HACCP system; training should be central in all national and international policies.

This study has a limitation in that its results cannot be generalized. Further studies could be conducted in the HoReCa sector to identify limitation/difficulties in HACCP application in other Countries,

taking into account the opinions of a broader range of workers (e.g. including cooks, dishwasher and waiters).

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