Can the inspection procedures in organic certification be improved? Evidence from a case study in Italy

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Abstract. The aim of this paper is to analyze if the effectiveness of the inspection procedures in the organic certification is conditioned by measurable structural and managerial factors under control of organic control bodies (CBs), and if there is scope for possible improvements. The analysis is based on data from the archives of the largest Italian organic CB, containing information on operators' characteristics, including a qualitative discrete risk score defined by the CB, inspectors' characteristics, type of inspection and the outcome of the inspection, in terms of noncompliance detected and sanctions imposed. The aim is to analyze factors that could make an inspection more effective. Our measure of effectiveness is the number of detected noncompliance per inspection visit. No specific literature on this issue is available, therefore on the basis of available information we develop a set of hypothesis concerning measurable factors that might have an effect on the effectiveness of the inspections. Discrete choice models are used to estimate the likelihood of noncompliance conditional to a set of covariates concerning risk assessment of the operators, inspectors characteristics, and modalities of the inspections. Different models and their distributional assumptions are discussed and tested. Results show that there is scope for an increase of effectiveness of inspections, and the particular relevance of two factors: samples taken during the inspection and timing of the visit are confirmed as significant factors increasing the likelihood of both slight and severe noncompliance.

Keywords: Organic certification, non-compliance, inspection visits, discrete choice models.

1 Introduction

Certification in organic farming is required to qualify a product as organic and to ensure that organic products are produced in accordance with organic regulations. Council Regulation No 834/2007 (EC, 2007) regulates the production and marketing of organic food products in the European Union. The Community legal framework defines the basic principles and rules of production and control (i.e., inspection) and certification system that are used to enforce these rules.
Organic certification is based on controls for noncompliance with Council Regulation No 834/2007, and can be considered to exploit the general concept of food safety (Hanson and Caswell, 1999, Garcia and Martinez, 2007). Controls for assuring the compliance with organic standards should be carried out on the basis of a risk based approach. For an analysis on risk based controls on the food safety systems see among others van Asselt et al. (2012), Hutter and Amodu (2008); Hirschawer and Zwoll (2008). The issue of risk based controls in the organic sector is receiving recently a growing interest: see for instance Zorn et al. (2012, 2013) for an application of the concept of risk based controls to the German organic farming; Gambelli et al. (2012, 2012a, 2012b) for an application on the same the concepts on the Italian organic farming, and Zanoli et al. (2012), for an analysis of noncompliance in the Turkish organic farming system. Padel (2010) provide an analysis of the organic regulation, discussing the potential for a proper implementation of a risk based approach, and Dabbert (2011) provide an analysis of potential areas of improvements for the organic certification rules, also discussing the potential benefits from a implementation of risk based inspections.

The aim of this paper is to contribute to the analysis of the effectiveness of organic certification systems, though with a change of perspective. Most of the studies cited above consider how to improve the inspection system looking for the main risk factors of noncompliance at the farm level. The aim of this paper is to consider the potentials for improvements of the effectiveness of organic inspections, analysing a set of empirical data concerning the outcomes of inspection visits performed by the main Italian Control Body (CB). In particular we analyze if the effectiveness of inspections, is affected by specific characteristics of the inspectors and of the inspections (i.e. sampling and timing of the inspection). Data are obtained from the archives of the CB concerning the outcomes of the inspections in terms of sanctions and noncompliance, with the information on the type and modalities of the inspection and on the inspectors' characteristics. The analysis is based on discrete choice models, and the study is part of the EU research project CERTCOST.

The structure of the paper is as follows. In the next section, we provide a short overview of the functioning of the organic inspection and certification system in the European Union, focusing on aspects concerning the implementation of the certification system in Italy; in section 3, we describe the data used in the empirical analysis and discuss our approach to analyzing factors that we expect might affect the effectiveness of the inspections; in section 4 we present and discuss the results of the analysis; in section 5 we provide the conclusions of the paper.

2 The legal framework of the organic certification in Italy

The legal framework (EC, 2007) is implemented by the European Commission through Council Regulation No 889/2008 (EC, 2008), which defines the details of the organic production standards and controls (EC, 2007, Art. 38) to keep the legal requirements up to date with market, societal and technological developments. The Food and Veterinary Office of Europe is responsible for monitoring the compliance of Member States with the European organic regulations. An overview of the implementation of the inspection and certification systems in Germany and Italy in specific is given in Figure 1.

The member states are each required to designate a competent authority to oversee and manage the correct implementation of the European organic regulations. The legal framework is implemented with country specific modalities, and here we describe the Italian situation. Italy has designated the Ministry of Agricultural, Food and Forestry Policies (MIPAAF) as the competent authority. Inspections and certification are delegated by the competent authorities to private CBs according to EC (2007), which must be approved by the Ministry of Agricultural, Food and Forestry Policies (MIPAAF), and accredited by the accreditation body (Accredia). To obtain such approval, control bodies must meet three criteria: impartiality, transparency and competence. According to EC (2007), Art. 27(8), competent authorities must organize audits and inspections of control bodies in their territory. The aim of this supervision system is to verify that the control bodies properly perform the inspections and that the basic criteria for their approval are still fulfilled. The supervision activities include the review of relevant documentation and the inspection of organic operators. The regional competent authorities annually report information on the supervision system directly to the national (competent) authority, which reports the results to European Commission. The Italian competent authority delegates the supervision of the private control bodies to regional competent authorities (18 regions and 2 autonomous provinces) and the Central Inspectorate for the Control of Food Quality and Fraud Repression (ICQRF). The ICQRF supervises the activities of the control body independently from the regional competent authorities. Therefore, the Italian control bodies are subject to two distinct supervision procedures that do not necessarily employ the same criteria. In 2012, 15 control bodies were registered in Italy (SINAB, 2012).

Organic operators are free to choose the CB that inspects them. Control and certification have to be paid for by the operator. Producers receive financial support from rural development plans for organic certification, but in many regions, such support is available only for farmers involved in supply chain programs. According to EC (2007) Art. 27(3), each organic operator must be inspected at least once a year. Additional controls are required based on a risk analysis, but the European regulation does not provide any detailed rules regarding the frequency and nature of unannounced and follow-up inspections. CBs use some type of internal risk-based inspection system protocol to determine what additional inspections will occur. Accredia provides the accredited CBs with guidelines for rating individual operators based on a qualitative risk evaluation. Accredia also provides a classification for non-compliance and guidelines for the associated sanctions (Sincert, 2009).

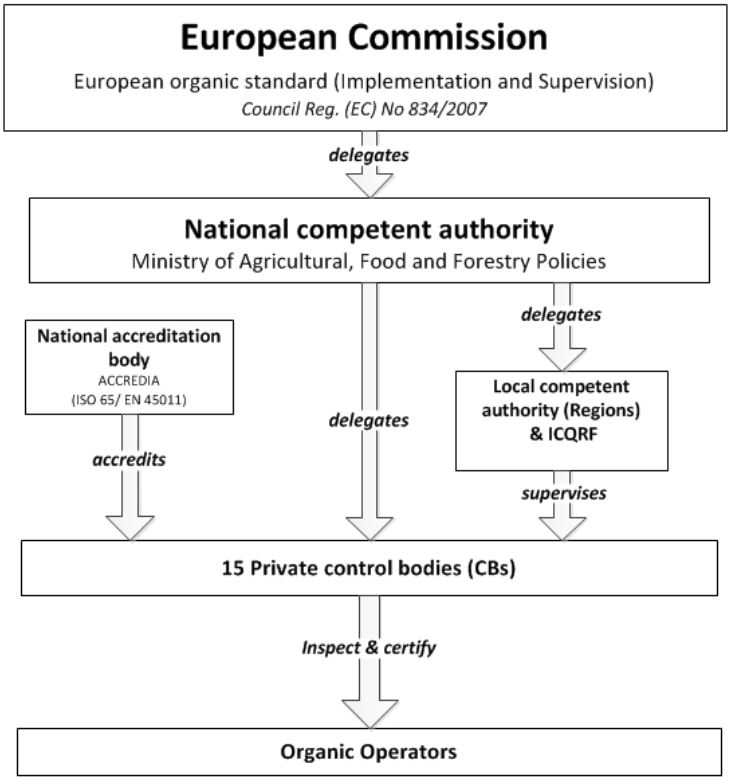

Figure 1. Overview of the main institutions and actors involved in the Italian organic certification process

3 Data and model

3.1 The data

The data are obtained from the archives of the largest CB in Italy. The dataset considers 37,930 inspections on 10,249 farms from 2007 to 2009. The distribution of inspected farms per year is sufficiently homogeneous, as 6,599 farms (64% of the sample) were included over all of the three years, and 1,859 farms (18%) were included for two consecutive years. Although our dataset cannot be considered as fully representative of the organic farming sector in Italy, it represents about 20% of the total Italian organic farms. The inspected farms are evenly distributed over the country, with 37% of the farms located in the southern regions of Italy, 32% in the central regions, and the remaining 31% in the northern regions. The average number of inspections per farm was 1.49 per year, and these are divided according to annual inspections (1.35 per year), follow-up inspections (0.05 per year), and unannounced inspections (0.09 per year). The inspections labelled as annual are on average more than 1 per farm/year (which is the mandatory requirement in the EU Regulation), as the farms might have been visited one time for each operation (i.e. crop production, animal production and processing). In each of the three years considered, the number of inspection generating slight sanctions was higher than the number of inspections generating severe sanctions. The share of inspections leading to slight sanctions decreases over the three years considered: from 7.88% in 2007 to 4.86% in 2009. Instead, the share of inspections leading at least to one severe sanction increases from 1.03% in 2007 to 1.82% in 2009 (see Table 3).

The aim of the analysis is to consider which factors under the control of the CB might have an effect on the likelihood of detecting a noncompliance. We therefore use two types of data: data on detected noncompliance, and data on the characteristics of the inspections and on the inspectors.

Concerning data on noncompliance, as for the 2007-2009 period no detailed information on noncompliance was available, we have used the number of sanctions imposed on an operator after the inspections as a proxy for non-compliance. In other words, we assumed that noncompliance was followed by sanctions, at

the appropriate level of severity. Regulation (EC) 834/07 classifies noncompliance as irregularities or infringements, and it is made clear that the former are less severe than the latter, although no explicit definitions are provided.

Noncompliance, once detected, is followed by the appropriate sanction, which is issued by the control body itself for all types of sanctions. The Accredia guidelines (Sincert 2008) define five types of sanctions that are ranked according to their severity, ranging from warnings to exclusion from the organic sector. The guidelines provide a clear correlation between type of noncompliance and sanctions, which means that a severe sanction is issued when a severe noncompliance is detected (i.e. an infringement), and a less severe sanction is issued in response to a correspondingly less severe non-compliance (i.e. an irregularity). In our analysis, we have followed the main distinction between irregularities and infringements, and have correspondingly classified sanctions into two categories (see Table 2): slight and severe. Slight noncompliance is associated with the sanctions of 'warning' (i.e. usually a simple letter with specific issues that need to be resolved before the next inspection, with no impact on certification) and 'intimation' (i.e. a more formal and ultimatum invitation to comply to resolve the detected issues, with no immediate impact on certification). Severe noncompliance includes the sanctions of 'suppression' (i.e. exclusion of the specific product or lot from organic certification), 'suspension' (i.e. temporary exclusion of the whole farm production from certification) and 'exclusion' (i.e. permanent exclusion of the farm and its productions from organic certification). Slight sanctions correspond to irregularities that mainly arise from the 'documental area' of the controls, e.g. missing or incomplete registrations, errors in the farm document archiving, lack of response to the control body requests, and/or missing mandatory documentation. In many cases, this level of non-compliance can even be accidental, or non-intentional, in nature. Severe sanctions, corresponding to infringements, refer to cases such as incorrect product identification and labeling, use of non-permitted substances, and/or cultivation of 'parallel' organic and conventional crops (e.g. organic and conventional wheat grown on the same farm in the same year). Furthermore, severe sanctions can be issued when the problems indicated in a slight sanction have not been correctly tackled and resolved by the farmer.

Table 2. Classification of sanctions

Type of noncompliance	Sanction classification	Type of sanction imposed	Description of sanctions' effects
Irregularity	Slight sanctions	Warning	Does not invalidate organic certification.
		Intimation	Does not invalidate organic certification but non compliance must be solved within a specific time period established by the Control Body
Infringement	Severe sanctions	Suppression	Implies the prohibition to sell as organic the product for which the non-compliance has been detected.
		Suspension	Implies the prohibition to sell all farm's products as organic. It is addressed to non-compliances considered as essential but with reversible effects.
		Exclusion[1]	Implies certification withdrawal. It is addressed to the operator as a result of non-compliance detected as essential and with irreversible effects.

The frequencies of various sanction types in absolute values are shown in Table 3. The share of slight sanctions decreases significantly over the three years considered: from 11.78% in 2007, to 7.05% in 2009.

[1] Exclusion can also be considered when an operator is not compliant with the contractual obligations with the CB.

On the other hand, for the same period, the share of severe sanctions shows a slight increase, from 1.55% in 2007, to 2.62% in 2009. In all three of the years studied, the number of slight sanctions was a lot higher than the number of severe sanctions, as infringements generally occur less frequently than irregularities. Over the three years covered by the analysis, there was a considerably high proportion of cases with zero sanctions, ranging between 91.57% and 98.88%, for slight and severe sanctions, respectively.

Table 3 Frequencies of sanctions by type and year

	2007	2008	2009
Total farms inspected	8,763	8,629	8,208
Total inspections.	12,955	13,238	11,697
Average inspection per farm (nr)	1.48	1.53	1.42
Total slight sanctions	1,021	704	568
% of inspection leading to slight sanctions	7.88	5.32	4.86
Total severe sanctions	133	239	213
% of inspection leading to severe sanctions	1.03	1.81	1.82

3.2 The model

Our aim is to explain the effectiveness of the inspection in terms of number of detected noncompliance using a set of factors related to inspections and inspectors characteristics. The list of the potential factors we have taken into consideration is shown in Table 4. When referring to dichotomous variables, the mean indicates the percentage of farms where that variable is present[2]. The potential factors influencing the inspection effectiveness are of two types: inspectors' characteristics, information about the modalities of the inspections. Inspectors' characteristics refer to the experience of the inspector and qualification for inspecting for other certification schemes (such as ISO 9001, NOP, JAS, DEMETER). The variable "inspector's experience" measures the number of years she performs inspections on behalf of the CB[3]. The hypothesis here is that the 'inspector's experience' could affect the effectiveness of the inspection in term of noncompliance detected. The variable "other certification scheme" measures could be a proxy of the skills and qualification of the inspector. We expect that more skilled inspectors might be more effective in terms of detected noncompliance.

Information about the modalities of the inspections refers to type of inspections, samples taken during the inspection, inspection timing and specific farm's risk class. All organic operators receive at least one inspection each per year, while additional inspections are done on a subsample of operators on the basis of inspection schemes decided independently by each control body, with no common approach for control frequency and share of unannounced. The mandatory inspections type refers to the ordinary annual inspection as defined by the EC (2007), Art. 27(3), and includes the examination of all relevant documents and process managed by the operators. Follow-up inspections are additional inspections aimed at better control of the operators, following the detection of noncompliance during the previous inspection. Announced inspections have the same characteristics of the mandatory inspections, but they are carried out without notice to the operators. Their frequencies can be based on determined on the basis of the risk of occurrence of noncompliance. Dummies for follow-up and unannounced inspections are included to discriminate the potential effects in terms of effectiveness of noncompliance detection that might be due to the two types of inspections. Dummy for annual inspection is not used to avoid collinearity. Inspection could also be accompanied by sample collection of specific products. Samples of products can be tested for the presence of pesticides residues and other non-admitted external input. For what concern severe sanction model, we use dummy variable to measure when a sample is taken as we expect that sampling might affect the likelihood to detect severe noncompliance.

[2] SD for a dummy variable with mean p, s.d. is: (p (1-p))1/2 i.e. s.d. for dummy variables is the higher the closer p is to 0.5.

[3] The variable ignores if the inspector was working as inspectors with other control bodies in the past, so it potentially underestimate the actual experience of the inspector.

We also want to take into account the timing the inspections are made, as we expect that the likelihood of noncompliance detection could be conditioned by the time the inspection is made, at least for certain types of farm. In order to establish whether or not the inspection are made at the appropriate time, we take into account the phenological stages of both crops and livestock productions of the farm at the time of the inspection. For each crops/livestock we defined "critical periods", i.e. time intervals when the crops and livestock species are more likely to need specific treatments (e.g. for pest and diseases). For each farm we can therefore define time periods when, according to the farm crop and livestock productions, we expect that the risk of noncompliance is higher. If a farm has several crops and/or livestock production, the timing of the visit could be: correct for all of them, or for some of them, or for none of them. To take into consideration these aspects, we develop a "timeliness index" as follow. For each farm *i*, we consider the number of crops and the number of livestock types that at the time of the visit *t* can be considered "at risk of noncompliance": respectively CR_{it}. and LV_{it}; we also consider the total number of crops and livestock types for each farm: $CRtot_i$, $LVtot_i$. The timeliness index T_{it} for each inspection is then computed as follows:

$$T_{it} = \frac{CR_{it} + LV_{it}}{CR\ tot_i + LV\ tot_i} \quad (1)$$

where *t*=time of inspection; *i* = i=1…n (n=total nr of farm)

Tit ranges between $T_{it} = 0$ (i.e. during the inspection no one of the crops/livestock types managed by the farm were considered at risk of noncompliance) and $T_{it} = 1$ (i.e. during the inspection all crops and/or livestock were considered at risk of noncompliance). The average value of T_{it} is 0,29, (see Table 4)far below the theoretically optimal situation where all inspection are done in the optimal timing for each farm.

The effect of specific farm's risk of non-compliance is measured by the risk index adopted the CB to rank the organic operator in terms of risk, on the basis of a set of risk factors provided by Accredia (SINCERT 2008). Operators are classified as high risk, medium risk and low risk operators according to a set of criteria concerning the type of crops and livestock production, the occurrence of noncompliance in the past, the farm size, marketing aspects. Gambelli et al. (2012a; 2012b) have provided an in depth analysis of the risk factors at the farm level, showing that the qualitative categorization of risk factors followed by the Italian CBs is generally supported by empirical evidence though with some specific exceptions referring to specific crop productions. In our model we have used the risk index to "neutralize" the effects of farm's attitude to risk, which would otherwise bias the measurement of sanctions occurrence according to the explanatory variables referring to inspections' and inspectors' characteristics.

Table 4 Variables (risk factors) included in the models

Variable	***Description***	***Mean***
Inspector's experience	Nr of years an inspector works with the same CB Min: 0 Max:16 s.d.: 3.59	7.60
Other certification scheme	Whether or not an inspector also controls for other schemes than organic; = 1 yes; = 0 no	0.56
Annual inspection	= 1 yes; = 0 no	0.91
Follow-up inspection	= 1 yes; = 0 no	0.03
Unannounced inspection	= 1 yes; = 0 no	0.06
Sample	= 1 yes; = 0 no	0.08
Inspection timeliness	Timing index Min: 0 Max:1 s.d.: 0.30	0.28
Risk class 1	Whether or not an operator is associated to low risk class; = 1 yes; = 0 no	0.66
Risk class 2	Whether or not an operator is associated to medium risk class; = 1 yes; = 0 no	0.23
Risk class 3	Whether or not an operator is associated to high risk class; = 1 yes; = 0 no	0.11

We have defined two models, one for the slight sanctions, and one for the severe sanctions. The two models differ just for the inclusion in the latter of the explanatory variable "sample", as sampling is not applicable when irregularities (i.e. slight sanctions) are concerned. The outcomes in terms of slight or severe sanctions are the dependent variables for our models, measured over the total number of inspections in the 2007-2009 period. A logistic regression (see Greene, 2008 among others) is used in both models, and takes the form:

(2)

where Y is a dichotomous variable indicating the occurrence of sanctions, i=1,…,n are the n total inspections made in the 2007-2009 period, **x'** is the vector of explanatory variables, and b the vector of coefficients.

4 Results and discussion

Table 5 shows the results of the estimations for the slight sanctions and severe sanctions cases, respectively model 1 and model 2. Concerning model 1, annual inspections and follow up inspection have significant coefficients[4], though with opposite signs. Follow-up inspections show a negative coefficient, indicating that in the case of model 1 the irregularities (i.e. mainly bureaucratic and formal noncompliance) can be solved quite effectively in the time period between the inspection when the follow-up has been decided, and the actual follow-up inspection. On the other side, unannounced inspection have a positive coefficient, showing that they increase the likelihood of sanctions. Covariates concerning the inspectors' characteristics show significant and positive coefficients for the "other certification schemes", while the coefficient of the inspector's experience is significant and negative. The "inspection timeliness" does not show relevant effects on the likelihood of slight sanctions, which is quite consistent with the type of noncompliance involved: bureaucratic flaws are likely to happen independently with respect to time. Finally the "risk class1", i.e. the lowest risk category of farm, has a positive and significant coefficient, which again seems consistent with the occurrence of slight sanctions.

Concerning model 2, we have quite a different picture. The type of inspections does not show relevant effects on the likelihood of severe sanctions, and the same applies for the experience of the inspectors. However, severe sanctions are strictly related with sampling during the inspections, and the "inspection timeliness" shows for model 2 a significant and positive effect. Consistently with the results of model 1, for model 2 the "risk class3", i.e. the highest risk class, have a significant and positive coefficient.

Comparing the results of the two models, we can try to formulate some considerations. Firstly, it emerges that the relevant factors that might improve the detection of noncompliance are different for slight and severe sanctions (i.e. irregularities and infringements). Secondly, for what concerns the characteristics of the inspectors, the experience has controversial effects: it does not show a concrete effect in the effectiveness of the inspection when severe sanctions are concerned, while it shows a rather unexpected negative effect for the likelihood of slight sanctions. We have no clear explanation for this result. Looking in depth at the data distribution we have observed that the share of slight sanction is particularly low for inspections made by inspectors with experience >12 years. We have however no hints to provide an interpretation for this result. On the other hand results for "other certification schemes" are more consistent with our expectations, showing positive and significant effect in both models. Thirdly, model 1 and model 2 seem to behave consistently for what concerns the risk classes: the likelihood of slight sanctions is higher for low risk farms, and the likelihood of severe sanctions is higher for high risk farms. Also, the timeliness of inspections and the sampling are relevant factors for the severe sanction model only, which is consistent with our expectations: infringements are more likely to be detected when the inspection is made in the "critical" time periods of the livestock or crop productions. The significance of sampling (which was tested for model 2 only) could have different interpretations. On one hand, it could indicate that accurate inspections could be more effective in terms of noncompliance detection. On the other hand, this result could be "self–confirmatory" in the sense that inspectors make (costly) sampling when they have concrete suspects of infringements.

[4] Based on a significance level of 5% ($P<0.05$)

Table 5 Result coefficients for the slight and severe sanction models

Variables	*Slight sanction model*		*Severe sanction model*	
	Coef.	*P>|z|*	*Coef.*	*P>|z|*
Inspector's experience	-.03438	0.000	-.01288	0.284
Other certification scheme	.25384	0.000	.18883	0.030
Follow-up inspection	-.29011	0.048	-.38641	0.146
Unannounced inspection	.43889	0.000	-.16360	0.348
Sample			1.06657	0.000
Inspection timeliness	-.02074	0.783	.56999	0.000
Risk class 1	.23224	0.000	.01693	0.868
Risk class 3	-.09636	0.276	.32476	0.020
Constant	-2.84903	0.000	-4.50869	0.000
Nr Observations	37,930		37,930	
Log likelihood	-8,332.260		-2,963.566	
Lr Test (P >chi2)	0.000		0.000	

5 Conclusions

In this paper we analyze if the effectiveness of the inspections in the organic certification system could be improved. Our models are based on available data archived by the CB. The results are quite interesting and show that there is scope for improving the effectiveness of inspections following two main approaches, distinguished according to the type of noncompliance: irregularities (leading to slight sanctions) and infringements (leading to severe sanctions). In the first case, unannounced inspections and "skilled" inspector could increase the likelihood of detecting irregularities; in the second case the timing of the visit and the sampling procedures become relevant factors that could increase the likelihood of detecting infringements, together with the qualified skills of the inspectors. Our analysis shows that inspectors could exploit crops and livestock specific information at the farm level such as those related to the phenological stages. Actually the low value of the "timeliness index" indicates that only a limited share of inspections is carried out with the appropriate timing, showing therefore substantial scope for substantial improvement fo the effectiveness of inspections..

These results are of course strictly conditioned by the available data. The details concerning the inspectors are not particularly detailed, and more information could improve the quality of the results. Similarly, more details concerning the motivations and/or the procedures for sampling could help to reach a clearer interpretation of their effects on the effectiveness of inspections.

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