

Using a stakeholder analysis to assess the Mauritian food control system

DOI: 10.3395/reciis.v2i2.141en



*Shalini A.
Neeliah*

Faculty of Agriculture,
University of Mauritius,
Réduit, Mauritius
san.ahiscons@gmail.com



D. Goburdhun

Faculty of Agriculture,
University of Mauritius,
Réduit, Mauritius
daya@uom.ac.mu

Harris Neeliah

Department of Agricultural and Food Economics, University of Reading, PO Box 237, Reading RG6 6AR, UK
h.neeliah@rdg.ac.uk
Scholarship (university fees) funded by the University of Mauritius (2002-2007).

Abstract

Governments have the responsibility to ensure food safety and meet the obligations of the World Trade Organisation. One way of achieving this objective is by establishing food control systems. Food control systems need to be continually evaluated for improvement and to achieve higher food safety status. This paper assesses the usefulness of a stakeholder analysis and the use of an index in the evaluation of a food control system in a developing country context, that is Mauritius. The methodology applied, comprised a literature review and a questionnaire-based stakeholder analysis. On average stakeholders believed that components of the food control system and compliance of the food industry were adequate. The response of participants from governmental bodies was however different from that of representatives of non-governmental bodies for administration, enforcement, institutional mechanism for consultation and policy-making on national food standards and regulations and opportunities to make views known to the Codex through the Government. These could indicate problem areas. With respect to the index devised for assessing a FCS, Mauritius was classified as a country with a satisfactory food control system. It is interesting to see how these findings tally with previous studies although it is fully acknowledged that the methodological approaches and the timeframes differ. The stakeholder analysis thus presented evidence of the status of the Mauritian Food Control System (MFCS) and allowed a rapid but thorough assessment of the overall system. Given that no work has been carried out before to develop a food control index and categorise a food control system, further research is warranted to validate this methodology. Based on the stakeholder analysis, it is recommended that monitoring of the food control system be increased and the roles of local stakeholders in food control be redefined. The interaction between regulatory and non-governmental bodies should also be increased.

Keywords

food control system; stakeholder analysis; food safety; index; Mauritius

Introduction

Hazards occur along the food chain and governments, owing to their responsibility of maximising communal welfare, have to ensure the safety of food. Therefore national food control systems (NFCS) have been established to cope with threats of an unsafe food supply and are geared towards protecting consumers' health (Kenny 1996; Bruno 1996; Boutriff & Bessy 1999; Neeliah & Goburdhun 2007; Nguz 2007). Many countries are currently in the process of establishing a food control system or strengthening existing ones. But the effectiveness of national food control systems is often questioned (FAO 2006). According to Rees and Watson (2000), evaluation is a necessary stage in project management and results of an evaluation can lead to strengthening of a food control system. Continuous evaluation is consequently a *sine qua non* to assess the effectiveness of NFCS and to indicate areas that require improvement. This exercise is important to maintain food safety along the food system.

Mauritius has witnessed rapid economic growth since the early 1980s (World Bank 2007) to achieve a GDP/capita of US\$ 5059 in 2005 (UNDP 2007). This growth has concomitantly led to an increase in disposable income for the average Mauritian, resulting in fundamental changes in food consumption patterns and demand for food safety. Mauritius has an operational food control system (FCS) to ensure consumer health protection. In 2000 the FCS was overhauled with the introduction of a modern food legislation, the Food Act (MOH 1998). The objective of this paper is to evaluate the existing FCS by using an innovative approach. We are applying an as yet untried methodology to assess a FCS. It is based on a stakeholder analysis, whereby key actors in the NFCS are interrogated on the FCS using a semi-structured questionnaire. Their responses are then used to devise a food control index. This method is arguably more appropriate in a developing country setting, where food safety indicators are not necessarily systematically collected over space and time.

Review of literature

Components of the Mauritian food control system

The NFCS in Mauritius consists of four main components, namely, the food legislation, the administration, the enforcement and the supporting bodies. Vytelingum (2003) described the components of the Mauritian Food Control System (MFCS) in detail. The following sections present its salient features.

Food legislation in Mauritius

The first Act relating directly to food control in Mauritius, the Food and Drugs Act (1940), was made under the British rule. It incorporated the principle of protection of health and that of prevention of consumer exploitation. It had no officially stated objectives, but

contained certain basic elements of a food law, comprising a definition for food, the competence for implementation of the law, the powers of officers and penalties. It was an offence under the Act to add or abstract any substance so that food is made injurious to health and to sell any food not of the nature, substance or quality demanded.

The Food and Drugs Act and its regulations were probably appropriate in the fifties, but outdated and unable to cope with the major technological changes that had occurred in the Mauritian food system. Furthermore, regulations under it were not comprehensive. Penalties given for any offence committed under it was between Rs¹ 500-1000 with imprisonment not exceeding three months. These penalties for contravenants were absurdly low and did not represent a strong enough disincentive especially for a matter of public health concern. The law, therefore, was not appropriate to ensure the proper functioning of the MFCS. In 1998, there was a major legislative review leading to the development of the Food Act. More emphasis was laid upon modernising the law by prescribing new standards and consolidating it by incorporating all sections that are required for a modern Act. The Food Act, based on the Food Safety Act (1990) UK, has been in operation since the 1st of January of year 2000. The new Food Act makes it an offence to "import, prepare, supply, food not of merchantable quality". It is also an offence to "import, prepare, distribute, sell any food that is poisonous, that contains foreign matter, that is adulterated or that is unfit for human consumption. The new Act also strengthens the power of entry into food premises of authorised officers and allows for seizure of food for analysis (MOH 1998) and more detailed enforcement procedures ranging from improvement notices to emergency prohibition orders. Penalties inflicted to persons committing an offence under the Act range from a fine of not less than MRU² 2,000 and to imprisonment not exceeding two years. In addition, the Minister of Health may make regulations he deems necessary for the purpose of the Food Act. The scope of the Act is wide: with a wider definition for 'food'³ and greater range of activities or food businesses. The regulations have been made based on international Codex norms (MOH, 1998), after consultation between Government departments like the Nutrition Unit of the MOH and the Ministry of Agro-Industry and Fisheries (MOA).

Certain practical problems cropped up when the Food Act of 1998 became operational in 2000. These were transparent in various press articles (Ramsamy 2001) which related to the lack of consultation with stakeholders during the drafting stage of the law and outcry of street food vendors regarding the new provisions for hygiene. Another complaint was that there was too little time for compliance. These problems cropped up because the Mauritian food legislation was adapted from the British Food Safety Act of 1990 and therefore not completely applicable to the Mauritian context. Moreover, Mauritius has not picked up all the positive aspects of the British law like the 'due diligence' concept.

Administration and enforcement

At central government level, the MOH is responsible for food control in Mauritius (Vytelingum et al. 2000). The Health Inspectorate Division is a branch under the MOH and is responsible for enforcement of the Food Act of 1998. For sake of administrative convenience, Mauritius has been divided into five regions in which there are Health Offices. Each Health Office is managed by a Principal Health Inspector who is responsible for planning and directing food safety control in that particular region. Health inspectors perform various duties such as the inspection of premises to ensure compliance with public health laws, including environmental, occupational health, industrial hygiene, food, trade and industries, the implementation of health education programme, the issue of health clearance for premises such as food shops, butcher's shops, ships and aircrafts in accordance with public health legislation and prosecution for sanitary and food hygiene contraventions (MOH 1993).

The analytical services

The Government Analyst Division and the Pathological Division of the Central Laboratory are the main laboratories analysing food samples collected by the Health Inspectorate cadre or submitted by the food industry. The Government Analyst Division performs chemical analysis on foods while the Central Laboratory deals with the microbiological examination of food and water. These two laboratories are the only analytical services that are recognised under the Food Act.

Other supporting ministries

The Ministry of Local Government (MLG) exercises control over the activities of people in a given locality through the District Councils and Municipal Councils. Each has a Health Department, which issues and renews development permits and licenses for food premises upon health clearance from the MOH. The local authorities are also engaged in the inspection of markets (MLG 2008) where they have the duty of ensuring the sanitary quality of food being sold. Health inspectors from local authorities are not authorised officers as per the Food Act of 1998 but they derive their intervention powers from the Local Government Act of 2003.

The MOA has several departments dealing directly or indirectly with food control. The Dairy Chemistry and the Agricultural Chemistry Divisions carry out the analysis of various food items including primary agricultural produce (DCD 2006; ACD 2008). The Division of Veterinary Services issues import permits for products of animal origin. Animal product exporters depend on the analytical and technical assistance of the Veterinary Services because the European Union recognises it as its agent (DVS 2008). The Veterinary Services are also involved in the inspection of livestock and livestock products, in the issue of veterinary permits for export and in the supervision of manufacturing processes in

relation to veterinary products for exports (animal, fish). A new laboratory, the Food Technology Laboratory, has been established under the aegis of the MOA to deal mainly with food products meant for export. It will be accredited to ISO 17025 to meet obligations *vis-à-vis* the European Union.

Consumer organisations and trade associations

Two such organisations are known locally, namely the Institute for Consumers' Protection (ICP) and the 'Association des Consommateurs de l'Île Maurice' (ACIM). In recent years, consumer associations have raised consumer awareness about food safety problems through the mass media (Vytelingum et al. 2000). They also deal with consumer complaints pertaining to food, participate in seminars relating to food matters at a national, regional and international level and are involved in the drafting of MSB standards.

Trade associations such as the Association of Mauritian Manufacturers, the Association des Producteurs et Exportateurs des Produits Horticoles de L'Île Maurice (APEXHOM), the Mauritius Chamber of Commerce and Industry (MCCI) and the Mauritius Chamber of Agriculture (MCA) give a bargaining power to their members and provide services including legal assistance and technical backup. The contribution of these bodies to the professionalisation of the food sector is being recognised. Some of them also participate in food control indirectly by attending committees, sending their comments and organising training programmes on food issues.

Research institutions

The University of Mauritius undertakes research in the field of food control, but much of its works is not published. The Food and Agricultural Research Council (FARC) funds research on technical aspects of production. It provides policy advice to the Ministry of Agro-Industry and Fisheries and coordinates and supports research & development in the agricultural and food sector (FARC 2008).

Studies on the Mauritian food control system

Studies on the MFCS have been carried out from 1985 to 2002 (Dhamija 1985; Gajadhur 1998; Vytelingum 2000; Peersia 2001; WHO 2002). They show the evolution in the MFCS over the years. Dhamija (1985) provides a rather negative image of the FCS in 1985. He remarked that many ordinances and regulations had been issued piecemeal, did not cover all aspects relating to food and were being enforced by various agencies. Another finding was that staffing of enforcement and analytical services was inadequate. One flaw with this study was that the methodological approach used was one-sided as only the views of stakeholders from the regulatory side of the FCS were captured.

Gajadhur (1998) later attempted to identify the components of the MFCS. This study first mapped food control prior to the introduction of the Food Act in 1998. It showed that there were various laws that were being used in the field of food control⁴, the main one being the Food and Drugs Act of 1940. The Ministry of Health and Quality of Life (MOH) was the main enforcing agency for the Food and Drugs Act, although local authorities had a role to play in the issuing of licenses for food premises under the Trade and Industries Classification Act of 1954. Like the previous study, this study also relied on information collected from authorities and therefore shows only part of the status of the FCS.

The MFCS has later been described online (Vytelingum 2000), in connection with the Food Law Internet Project (FLIP). It is interesting to note that this attempt at describing the components of the food control system occurred when the Food Act 1998 and its regulations had just been effective, during a phase of transition when the main agents of food control were still adjusting to the new law. The description focussed on the Food Act and its regulations, its administration and enforcement, as well as the role of other supporting bodies.

Peersia (2001) then carried out a Strengths Weaknesses Opportunities and Threats (SWOT) analysis of the MFCS. Besides the Food Act 1998, she considered other food-related laws like the Fair Trading Act 1980 and the bodies involved in the administration and enforcement of the different laws, as well as voluntary control. According to Peersia (2001), many problems at the level of management and enforcement of the food law existed despite the fact that the law was adequate. The study showed that Mauritius had managed to improve at least its food legislation.

WHO (2002) carried out an assessment of the FCS based on an established profiling method (WHO 1989) using self-administered questionnaire. This WHO profile represents a one-sided view of the MFCS that is that of the MOH.

But to study the evolution of a FCS, it is appropriate to use an assessment methodology where views of all stakeholders of the FCS are sought on the different components that make up the FCS. FAO/WHO (2003) provided guidelines on how to establish a FCS. FAO (2006) builds on and complements the previous FAO/WHO guidelines. They recommend the use of a novel approach which obviates the necessity for audits at the level of food industries (WTO 2008). Thus the guidelines focus on government and food control authorities and allow self-assessment. We further develop and build on these two guidelines and apply a stakeholder analysis to assess the FCS in Mauritius. To our knowledge, no stakeholder analysis has been carried out to gauge the perception of the different stakeholders about the MFCS and its components. This methodology is more systematic and provides an improvement over previous studies.

Methodology

The main objective of the paper is reformulated as the following research questions:

- What is the status of the local food safety system?
- Can a stakeholder analysis be used as a tool to assess the local food control system?

It is hypothesised that the MFCS is satisfactory. Given that stakeholders are experts in their respective fields and are expected to give an objective and reliable assessment of food risks and how these can be dealt with by food control systems, it is therefore hypothesised that a stakeholder analysis can be used to systematically assess the MFCS.

Stakeholder analysis

Stakeholders are individuals, groups or institutions that have an interest in, or influence on, food safety and quality. They include:

- those who play a direct and leading role in food control management (government ministries, departments, agencies);
- those who play a secondary or supportive role such as groups that provide information used by those responsible for food control;
- those who are affected by food control management (consumer organisations, food industry and business groups, academic and scientific institution).

A stakeholder analysis is a technique suggested by FAO (2006) to identify and assess the importance of groups of people and institutions with influence on food control management. It is the process of systematically gathering and analysing qualitative information to determine whose interests should be taken into account when developing and/or implementing a policy or programme (Schmeer 1999) and to facilitate institutional and policy reform processes (World Bank 2001). To our knowledge this technique has not yet been applied to assessing a NFCS.

Data collection techniques and tools

Data collection was based on face-to-face questionnaire-administered interviews of the key players involved in the specific policy area of the FCS. This generated useful and accurate information about the MFCS.

Based on the literature review, it was possible to draw a list of issues associated with NFCS. As proposed by Jukes (2000), the questionnaire covered all the four major components of a FCS, namely, food legislation, administration, enforcement and the role of supporting bodies. Information flow, participation in the activities of national and international organisations and transparency of the FCS were also assessed. A rating scale (values 1 to 7: 1-2: very poor; 3-5 adequate; 6-7: very good) was used to ask respondents their judgement in terms of a set of ordered response categories that reflect the intensity of the particular judgement.

A seven-point rather than the more usual five-point scale (Oppenheim 1992) was employed to reduce the tendency for bunching of responses at the top end of the scale (Henson & Traill 1999). Moreover, the interviewees were also asked to identify constraints met and possible solutions to the problems they were currently facing in meeting their responsibilities. The key informants involved in the stakeholder analysis included representatives from:

- Ministry of Health and of the Quality of Life
- Ministry of Agro-Industry and Fisheries
- Mauritius Standards Bureau
- Public laboratories
- Consumer organisations
- Trade organisations
- Research institutions
- Professional bodies
- Representatives of the food industry (manufacturing, distribution, importing and exporting)

In certain cases, an organisation representing the interests of a group of players was interviewed, instead of meeting all the players themselves. A total number of 22 respondents, 11 from the regulatory side and 11 from the non-regulatory side, were interviewed.

Data analysis

The mean, median and range of the responses provided by the stakeholders were computed using SPSS 14.0. Cross-tabulation was performed to measure the association between the parameter: "category" (whether respondent from a regulatory or non-regulatory body) and affiliation with various other parameters under study in order to interpret where the difference lied. Since the number of respondents was less than 30, non-parametric tests were carried out, using the Mann-Whitney U Test, which is one of the most powerful of the non-parametric tests for comparing two groups of stakeholders (Moore & McCabe 2003).

Reliability analysis and construction of index

Henson and Traill (1999) observed that some aspects of food may be regarded as psychological constructs which can be measured by considering the level of agreement with a series of statements, the scores of which can be used to develop an index. This multi-item summated scaling technique was applied in the evaluation of the food control system based on the answers given by the stakeholders. This technique was one way of increasing the reliability of Likert scales. This is because the sum (or average) of a number of items should be more accurate than the response to a single question provided, of course, that all of the items used are genuinely caused by the construct in question (Oppenheim 1992).

There are a variety of ways in which reliability can be assessed (Frankfort-Nachmias & Nachmias 1996), the

most commonly used being Cronbach's alpha. The upper bound for α , approaches value one, with values above 0.7 generally accepted as demonstrating that a scale is internally consistent or reliable (Frankfort-Nachmias & Nachmias 1996). Each construct was examined using the procedures detailed above by SPSS 14.0 so as to eliminate superfluous items. Items with a low Cronbach alpha value, were not included in the calculation of the overall food control index.

Numerical values (1 to 7) were assigned to the question responses. These values were added up to obtain total scores for each respondent. Scores were then interpreted as indicators of the attitudes of the respondents on the FCS. When the total score of all stakeholders for all constructs is computed, the overall score for the food control system can be obtained. This figure can be expressed as a percentage of the score for an ideal food control system which is the base for comparison. The total score for an ideal food control system can be calculated by multiplying the number of constructs and the number of stakeholders by the maximum score, that is, $28 \times 22 \times 7$. The index thus constructed can be used as an indicator of the status of the food control system.

Results

Affiliation of stakeholders

Five, two, four and eleven stakeholders were respectively from the private sector, NGOs and civil society, parastatal organisations and Governmental bodies.

Status of food control and of the safety of foods

The respondents were asked about their perception of the current status of food control and food safety in Mauritius. Based on the mean and median scores, stakeholders judged the status of food control and the safety of foods to be adequate with a mean score of 4.05 and 3.73 and a median score of 4.00 and 4.00 respectively.

There were differences between the means and medians of the two groups of respondents (regulatory and non-regulatory bodies) with respect to their assessment of the status of food control and the safety of foods in Mauritius (Table 1). But, based on the Mann Whitney U test, there was a statistically significant difference at 5% level between the response of regulatory bodies and that of non-regulatory bodies for only the status of food safety in Mauritius.

Status of the components of the food control system

Stakeholders rated the different components of the FCS as adequate (Table 2). 'Enforcement of food law' obtained the lowest score, while the 'legal instruments' obtained the highest score.

Table 1 – Status of food control and food safety

Parameter	Mean (median) response provided by	
	Regulatory bodies (n=11)	Non-regulatory bodies (n=11)
Status of food control	4.27 (4.00)	3.18 (3.00)
Safety of foods	4.64 (5.00)*	3.45 (4.00)*

Note: (1-2: very poor; 3-5 adequate; 6-7: very good)

* Scores statistically different at 5% level

Table 2 – Evaluation of the components of food control systems

Component	All stakeholders	Regulatory bodies	Non-regulatory bodies
	Mean (median)		
Legal instruments	5.00 (5.00)	5.36 (6.00)	4.64 (5.00)
Administration of food law	3.36 (3.00)	3.82* (4.00)	2.91* (3.00)
Enforcement of food law	3.09 (3.00)	3.64* (3.00)	2.55* (2.00)
Supporting bodies			
Analytical services	4.18 (4.00)	4.36 (4.00)#	4.00 (4.00)#
Consumer organisations	3.41 (3.00)	3.55 (3.00)#	3.27 (3.00)#
Research institutions	3.55 (3.00)	3.55 (3.00)#	3.55 (3.00)#
Professional organisations (including trade associations)	4.00 (4.00)	3.82 (4.00)#	4.18 (4.00)#

Note: (1-2: very poor; 3-5 adequate; 6-7: very good)

same median

* Scores statistically different at 5% level based on Mann-Whitney U test

The mean response between the two groups of stakeholders was different (Table 3). According to non-regulatory bodies, the component with the lowest score was 'enforcement' (median = 2.00, that is very poor).

Based on the median score, stakeholders from regulatory bodies considered 'enforcement' to be adequate while stakeholders from non-regulatory organisations considered them to be very poor. The Mann-Whitney U Test showed that the difference between the response of regulatory bodies and non-regulatory bodies was statistically significant at 5% level for 'administration' and 'enforcement' components only.

Compliance with Food Act 1998 and adoption of Good Manufacturing Practices and HACCP

With respect to the compliance of the food industry with the Food Act 1998 and its regulations, most respondents rated the compliance of large food manufacturers, exporters and large hotel and catering industry as 'very good' (Table 3). Some stakeholders believed that large food importers might be accepting dumped food, probably explaining the lower score given to them compared to large food manufacturers, large hotel and catering industries and food exporters.

Table 3 – Compliance with Food Act 1998 and Food Regulations 1999

Type of industry	Mean	Range	Median
Large Food Manufacturers	5.50	3-7	6.00
Large Food Importers	4.86	3-6	5.00
Exporters	5.59	4-7	6.00
Small and Medium Scale Food Manufacturers	3.77	2-6	4.00
Hotel and Catering Industry (Large)	5.64	4-7	6.00
Hotel and Catering Industry (Medium and small)	3.91	2-6	4.00
Informal Food Sector	1.82	1-3	2.00

(1-2: very poor; 3-5 adequate; 6-7: very good)

There was convergence in perceptions of stakeholders over the very poor compliance of the informal food sector with local food legislation as ten out of 11 regulatory bodies and nine out of 11 non-regulatory bodies considered the informal food sector to be in very poor compliance with local food legislation.

With respect to the adoption of Good Manufacturing Practices or Hazard Analysis Critical Control Point (HAC-CP), large food manufacturers, exporters and large hotel and catering industry were considered to have a very good level of adoption, while small and medium food industries and catering operators had adequate level of adoption.

Participation in the food control system and involvement in standard setting

Stakeholders evaluated their degree of participation in the food control system as adequate (Mean= 4.77; median= 5.00). Out of 22 stakeholders, 12 stakeholders had participated in committees pertaining to food safety held by the MOH.

Stakeholders were satisfied (Mean= 3.68; median score=4.00) with their involvement in standard setting at the level of the MSB in Mauritius. Responses varied from 1 to 6, with seven out of 22 stakeholders considering themselves to have very poor involvement in standard setting.

Institutional mechanism within the country for consultation and policy-making on national food regulations

On average stakeholders were satisfied (Mean = 3.73; median score = 3.50) with the institutional

mechanism for consultation and policy-making on national food regulations with 10 out of 22 stakeholders considering it as adequate.

Table 4 presents the difference in the mean and median scores of stakeholders with different backgrounds. Based on median scores, regulatory bodies considered that the institutional mechanism for consultation and policy-making was adequate (median score = 5.00) while non-regulatory bodies considered it to be very poor (median score = 2.00). There was a statistically significant difference in the scores of the two groups at 5% level based on the Mann Whitney U Test.

Opportunities to make views known within CODEX through the Government

Eight out of the 22 respondents considered that the opportunities to make views known within Codex through the government were very poor. On average, respondents considered it to be adequate (Mean = 3.45; median = 3.00). Respondents who submitted their views stated that they did so through the Codex Contact Point.

Based on median scores, regulatory bodies considered that the opportunities to make views known to Codex through the Government was adequate (median score = 5.00) but non-regulatory bodies considered it to be very poor (median score = 2.00). There was a statistically significant relationship at 5% level between the category of the stakeholder and his/her satisfaction with the degree of satisfaction with the stakeholders' opportunity to make his/her views known.

Table 4 – Satisfaction with institutional mechanism for consultation and policy-making

Parameter	Mean (median)		
	All stakeholders	Regulatory bodies	Non-regulatory bodies
Satisfaction with institutional mechanism for consultation and policy-making	3.73 (3.50)	4.55* (5.00)	2.91* (2.00)
Opportunities to make views known within CODEX through the Government	3.45 (3.00)	4.55* (4.00)	2.36* (2.00)

Note: (1-2: very poor; 3-5 adequate; 6-7: very good)

* Scores statistically different at 5% level based on Mann-Whitney U test

Information flow

The mean response for the flow of information from regulatory bodies to the public about the food control system (indicative of the degree of transparency) was 2.91 (median=3.00), with seven respondents giving scores of 1 and 2. None of the stakeholders interviewed regarded information flow in Mauritius on the FCS as 'very good'. The mean score of non-regulatory bodies (2.64) was lower as compared to stakeholders from the regulatory bodies (3.18).

Reliability analysis and index for food control system

A food control index (FCI) to measure the status of the MFCS was developed from the stakeholders' response to all the questions. Items chosen after performing Cronbach's alpha reliability test included the attitude of stakeholders towards the following:

- Current status of food control
- Quality and safety of food
- Legal instruments designed for food control

- Administration of food law
- Enforcement of food law
- Role of supporting bodies (Analytical bodies, consumer organisations, research institutions and professional bodies)
 - Information flow
 - Level of participation
 - Involvement in Codex policy setting
 - Satisfaction with institutional mechanism for consultation and policy-making
 - Compliance with relevant laws and regulations (not for all categories of the food industry)
 - Self-regulation in food industry (not for all categories of the food industry)

Based on the reliability statistics, it was reasonable to construct the FCI based on all the 28 constructs as all the scales were internally consistent and reliable as the overall coefficient was satisfactorily greater than 0.7. The FCI was based on the principle of aggregation (Frankfort-Nachmias & Frankfort 1996) and was calculated as follows:

$$FCI = \frac{\text{Total score for MFCS} * 100}{\text{Number of stakeholders} * \text{max imum score} * \text{number of constructs}}$$

The FCI for Mauritius was 58.5%. Thus the MFCS can be classified as a Class C⁵ FCS.

Discussion

General status of the Mauritian food control system

Based on the overall FCI derived in this study, there is evidence that Mauritius has a satisfactory (class C) FCS. In fact, the status of food control and that of food safety in the country have been judged to be adequate by local stakeholders. However, there was a statistically significant difference in opinions expressed by stakeholders from regulatory bodies and those from non-regulatory bodies with respect to the status of food safety. This difference in perception can be attributed to the fact there is dualism in the domestic food supply. On one hand, there are small and medium scale food operators and the informal food sector. Most operators in the informal food sector lack the basic hygiene knowledge or do not comply with the food safety regulations. On the other hand, there are large-scale operators who have a high degree of compliance with local food legislation and have adopted self-regulation practices, as highlighted by the stakeholder analysis. Thus the stakeholder analysis has unfolded a problem area.

Another point to consider is that stakeholders from the non-regulatory organisations have distinguished between the safety of food available in the local informal food sector and imported foods. The latter was considered to be generally safe and of high quality while the former of poor safety since cold chains were not system-

atically present. Stakeholders also pointed out that there was a mechanism for monitoring of imports, but it was constrained by a shortage of trained staff. This finding concurs with WHO (2002). Data on detentions and rejections of food consignments is not comprehensive, unlike developed countries like the US, where such data are compiled and made publicly available⁶.

Food legislation

The mean rating for the component 'food legislation' was 'adequate' (5.00). In fact food legislation was the component with the highest average score and with no divergence among stakeholders from either regulatory or non-regulatory background. This can be explained by the fact that the law is modern and contains most of the essential requirements of an ideal food law. Since, the legislative system had not been supportive of food control for rather a long time in Mauritius, the new law was acclaimed. The Food Act 1998 was adapted from the UK food law, but unlike the latter it has not constantly evolved, but has rather been drastically modernised in 1998 with a full and consolidated text for regulations.

It was also pointed out that the food law in itself was good, but the only point of contention related to the way it had been drafted and introduced to the industry.

Administration and enforcement

A statistically significant divergence in perception of 'administration' and 'enforcement' existed among regulatory and non-regulatory stakeholders. The results indicate that administration and enforcement are two problem areas. This can be attributed to the absence of a national strategy for food safety. Thus administration and enforcement suffer from lack of coordination and duplication of work, leading to wastage of resources and gaps in coverage. In-depth interviews with stakeholders revealed that some of these problems already existed prior to the introduction of the Food Act 1998 while others have emerged or been exacerbated with the new food law. These results further show that participants were from two distinct backgrounds. Each group of stakeholders favourably assessed parameters related to them. For instance, stakeholders from regulatory authorities gave higher scores to enforcement (3.00) compared to stakeholders from non-regulatory bodies (2.00).

Supporting bodies

The MFCS requires the assistance of certain supporting bodies to be fully effective. There is, nonetheless, no framework defining the role and responsibilities of the different supporting bodies with respect to the FCS. All categories of supporting bodies have been scored as being generally 'adequate'. However in-depth interview revealed a number of inadequacies at the level of supporting bodies. This shows the relevance of using methodologies such as stakeholder analysis and in-depth interviews, as was the case in the current study.

Analytical bodies

It is worth mentioning that findings from the stakeholder analysis show that there have been no major improvements in laboratory facilities existing locally as compared to findings from previous studies (Peersia 2001; Saib 2002; SADC 2002). Some stakeholders have been critical of the laboratory facilities existing in Mauritius, considering them to be poorly equipped, not using modern analytical methods or appropriate quality assurance procedures. It is important to note that although a number of governmental and parastatal laboratories are involved in food testing locally, only MOH laboratories are recognised under the Food Act of 1998. Stakeholders were also convinced that the full operation of the Food Technology Laboratory, being established under the MOA would improve the situation. However, it would have to be formally recognised by the MOH as well.

Trade organisations, professional bodies and research institutions

Professional bodies were generally considered to be adequate. This study has shown that there was a lack of professional bodies like the International Food Science and Technology that provide technical back-up to the food industry, enforcers and policy-makers. In fact, trade associations assume a big role locally towards improving the FCS. For instance, the Mauritius Chamber of Agriculture has categorised the various food sectors in Mauritius and is working towards fostering the growth of small and medium enterprises through the clustering concept. However, stakeholders considered that focus of these associations was on increasing volume of food production and not necessarily increasing the safety of food.

Among the supporting bodies, research institutions gained the lowest score. Stakeholders were of opinion that research institutions were not well organised. There was no national strategy for food research in the local context and there existed no mechanism to help institutions contribute to food control. Although food safety had been identified by one institution as a priority area, it had been impossible to initiate research on it because of a lack of funds, staff and infrastructure. At the moment, it seemed that research institutions could only participate in food control through their input in committees organised by regulatory bodies such as National Codex Committee (MOA) and by the National Standards Body, that is, the Food and Agricultural Committee (MSB). However, it must be pointed out that the University of Mauritius is actively involved in furthering knowledge in food science through its training and research activities.

Consumer organisations

The medians of the response of regulatory and non-regulatory bodies were the same for their evaluations of the consumer organisations, indicating a convergence of perceptions. The involvement of consumer organisations was currently very limited because of the lack of quali-

fied personnel and finance. Moreover, they did not have adequate scientific back up.

Implementation of the Food Act 1998 and regulations by the local food industry

There was general agreement among stakeholders from regulatory and non-regulatory bodies over the status of compliance of all categories of local food businesses with local food legislation. All agreed upon the very poor compliance of the informal food sector with local food legislation. Respondents' opinions of the status of self-regulation among all categories of the food industry also converged. Self-regulation is used by local manufacturers as a competitive tool and for improving the safety of the product. The fact that Mauritius is a major destination for tourists, forces large hotel and catering industry to adopt such food safety management systems as an assurance for their clients. Exporters are forced to adopt systems such as HACCP because it is mandatory in their export market.

Large food manufacturers, large food exporters and the large hotel and catering industry in Mauritius have established very good voluntary practices, that is, self-regulation. Our findings are therefore in line with previous reports (Chung 2000; Baomy 2001; Peersia 2001; Dooky 2001) about the compliance of the local food industry with food legislation and the establishment of voluntary food safety management systems in the large food industries and the large hotel sector. For instance, Dooky (2001), in a study involving the implementation of the Food Regulations in large hotels, concluded that most of hotels surveyed were able to meet the new requirements under the new regulations since they already had in place an integrated approach for food safety management.

There was unanimous view about the poor compliance of the informal food sector with legislation. Findings of this study confirm the conclusions of past studies pertaining to the informal food sector (Jugessur et al. 2000; Joomun 2001; Duffaydar 2001; Rumjaun 2001). Absence of control over the informal sector in a country can also be a factor limiting the proper functioning of a FCS (Igbediho & Akinyele 1992). The convenience and the affordability of food available through the informal channel could explain why Mauritians procure food from the informal food sector.

Participation in the food control system, information flow and interaction with international standards making organisations

The stakeholders were generally satisfied with their participation in the FCS and their role in standard setting. This indicated that each stakeholder was conscious of his role and responsibility in the FCS and strived at meeting those within the resources available. Stakeholders gave low scores for the 'information flow' criteria, showing that transparency is still a problem

in Mauritius. Although sufficient information may be available, the dissemination is not good. In Mauritius, resources are so limited that they are rarely used for promoting information flow. The lack of free flow of information between agencies involved in food control in Kuwait has been identified as an important constraint (Alomirah et al. 2004). Usually in developing countries, formal channels of communication between food control organisations and consumers are generally lacking or exist only through consumer complaints. The fact that little information transpires about the FCS may cast some doubt in the mind of other stakeholders and the public at large or create unnecessary scares. Instead, various types of information could be shared among all stakeholders and used for educating the public, for instance, information relating to the compliance rate of food businesses. This could help boost up confidence of all stakeholders in the FCS.

There was also a statistically significant difference in the response of stakeholders from regulatory and non-regulatory organisations with respect to the institutional mechanism for consultation and policy-making on national food standards and regulations. This could be attributed to the fact that stakeholders from the non-governmental side believed that there had not been enough consultation before the introduction of new food legislation. Moreover, there was statistically significant difference in the response of stakeholders from regulatory and non-regulatory organisations with respect to their opportunities to make views known to Codex through the government. This was probably due to the fact that there was little satisfaction with their ability to make views known and that not all stakeholders were involved in Codex Policy Setting.

Stakeholder analysis

This study has demonstrated the use of stakeholder analysis as a potential tool for the evaluation of a FCS. Each group of stakeholders favourably assessed parameters related to them, for instance, stakeholders from regulatory authorities gave higher scores to food legislation compared to stakeholders from non-regulatory bodies, but this divergence in perceptions was statistically significant in the case of the assessment of the status of food safety, administration and enforcement components, consultation and opportunities to make views known within Codex through the Government. This divergence of opinions may be indicative of a problem area. Another reason that could account for the difference in opinion was the lack of information flow among stakeholders from regulatory and non-regulatory bodies.

It is important therefore to include stakeholders from both sectors when preparing any food control strategy or food legislation so that their views are incorporated. By including stakeholders from both backgrounds in an analysis of a FCS, a more balanced and complete view is obtained and this altogether improves the quality and reliability of the assessment. This philosophy concurs with Houghton (2008) who stressed

on the importance of involving stakeholders food risk management. Quality and reliability of the assessment is reflected in the FCI. The methodology applied here can be used in other countries to derive food control indices and thus make international comparisons of NFCS. This information can be used by Ministries responsible for Health and international donors to establish and fund programmes.

Conclusion and recommendations

Starting from the assumption that stakeholders of the food industry are experts and are most likely to make apt judgements about the FCS, a stakeholder analysis was carried out. A FCI was also computed based on the responses of the stakeholders. It was found that there was no statistically significant difference between the medians of the responses from regulatory and non-regulatory bodies, except for the following variables: rating of the status of the quality and safety of food, administration and enforcement, consultation and opportunity to make views known to Codex through the Government. These could indicate problem areas. Based on the FCI, Mauritius has a satisfactory FCS.

This stakeholder analysis has presented an up-to-date status of the Mauritian Food Control System. It is interesting to see how these findings tally with previous studies although it is fully acknowledged that the methodological approaches and the timeframes of studies differ. According to the stakeholders, there has been no major improvement in the MFCS except for the revamping of the food legislation. The rapid methodological approach allowed an in-depth assessment of the system. Given that no work has been carried out before to develop a FCI and categorise a FCS, further research is warranted to cross check our results and also to track the evolution of the MFCS over time. Thus, the same analysis should be systematically carried out every two years. However, for this methodology to be effective, there is need to include a blend of stakeholders from the regulatory and non-regulatory domains and to make a careful choice of parameters to be used in the food control index construction.

Acknowledgement

The authors acknowledge the statistical guidance provided by Dr A. Ruggoo and the contribution of the stakeholders of the local food control system.

Notes

1. 1 US\$ \approx 30 MRU.
2. MRU: Mauritian rupees
3. Any article or substance meant for human consumption including drinks, bottled water, chewing gum, articles and substances used or intended for use as ingredients in the composition or preparation of food but not live animals, feedstuffs, drugs or medicine and hormonal products.

4. These are the Public Health Act (PHA) 1981 (amendment), the Food and Drugs Act 1940 and the regulations thereof, for instance, the Food and Drugs (Salt) Regulations 1989, the Trade and Industries Classification Act 1954 and the Meat Act 1974.
5. Class A (Very good: 70-100); class B (Good): 60-69; class C (Satisfactory): 50-59; class D (Poor): 40-49; Class E (Very poor): <40.
6. www.fda.gov/ora/import/default.htm

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About the authors

Shalini A. Neeliah

Shalini Neeliah joined the Dairy Chemistry Division as a Technical Officer in 2001 and presently works as Senior Research and Development Officer at the Food Technology Laboratory of the Ministry of Agro-Industry and Fisheries. After her first degree in Agriculture, she did her masters in Food Technology at the University of Reading. Now she is doing MPhil/PhD at the University of Mauritius on a part-time basis and the research project deals with the impact of SPS measures on food exports from Mauritius. Her research interests are in the areas of food safety, food microbiology, food control system, quality assurance, and food trade. She is also a part-time lecturer at the University of Mauritius and have serviced modules pertaining to food legislation and food quality assurance. She has also been involved in a SADC Regional Training Programme entitled "Strengthening informal sector-food processing and safety" and has developed a guide on food processing. She has also contributed to the writing of papers and technical reports pertaining to food control systems and food security. She is currently involved on the development of food standards at the Mauritius Standards Bureau.

Daya Goburdhun

D. Goburdhun joined the Faculty of Agriculture in 1989 as lecturer and is presently Associate Professor in Food Science and Technology at the Faculty of Agriculture, University of Mauritius. Daya's first degree was in Agriculture and I later specialized in the field of Food Science. The research interests are in Food control system; food safety; postharvest technology and nutrition. Daya's funded research projects were on detoxification of proteases inhibitors in pulses; food processing and postharvest technology. Daya is a member of the Institute of Food Technology (USA). Daya has been involved in the SADC Regional Training Programme "Strengthening informal sector-food processing and safety" and has developed a guide on food processing. Besides lecturing to graduate and post-graduate students, over the past years, Daya has designed several non award courses in Food safety, food quality ,healthy eating for entrepreneurs, children. Daya has also contributed to several papers and technical reports pertaining to food safety, quality, postharvest and nutrition. Daya is actively involved on the development of food standards.