Genetically modified foods and their social representation

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ABSTRACT

Considering the great impact of genetic modification in food production, it is important for food companies, policy makers and regulators to understand how consumers make sense of this technology, especially in developing countries, which are intensive producers. This study aimed to explore public opinions, beliefs, attitudes and behavior towards genetically modified food (GMF). Forty-eight consumers were interviewed and data analysis was performed through the Collective Subjective Discourse, a method based on the Social Representations Theory. Results showed that GMF are seen as unnatural and artificial. Positive attitudes and willingness to purchase are associated to personal and social benefits, while risk and fear of side effects underlie negative attitude. Genetically modified (GM) plants and microorganisms are seen more favorably then GM animals (clearly rejected). This work contributes to deepen the debate about GMF through the structural approach of social representation. The findings might be useful to direct more efficient communication strategies.

1. Introduction

The widespread use of genetic engineering in food production reflects the strength of agriculture and food industries, especially in developing countries. Twenty-eight countries cultivate transgenic plants, resulting in a planted area of 181.5 million ha and an increase of over 100 times since 1996 (James, 2014). In South America, Argentina (24.3 million ha) and Brazil (42.2 million ha) stand out and in the latter, the main transgenic crops are soybean, corn and cotton. Genetically modified beans, developed by the Brazilian Agricultural Research Corporation (EMBRAPA) are also approved for cultivation and consumption since 2011 and may soon be on the Brazilian tables (Comissão Técnica Nacional de Biossegurança, 2014).

Despite the benefits claimed by the producers of genetically modified plants, consumer groups and governments have opposed the cultivation and marketing of genetically modified foods (GMF). The acceptance or rejection of a food product produced with an emerging technology such as genetic engineering is the result of a complex decision-making process involving the assessment of the risks and benefits associated with the technology, consumer's needs, beliefs and attitudes and, ultimately, the economic, political and social context in which the choices happen (Henson, 1995).

The best way to understand how consumers make sense of new technologies is to interact directly with them and collect information such as knowledge, beliefs, opinions and feelings about the subject of interest. For this sake, qualitative research techniques have been widely used in social and consumer studies (Flick, 2004; Lawless & Heymann, 2010; Lefèvre, 2006; Malhotra, 2001). Nonetheless, given the richness of empirical data collected mainly in interviews, it is interesting to use a method of content analysis that not only reveals people's thoughts but also permits the selection of what is really salient in the speech of the researched public (Lefèvre, 2006). In this sense the Social Representations Theory is an interesting framework for studies on consumer's perceptions of emerging technologies.

As defined by Moscovici (1988), social representations are "sets of values, beliefs and metaphors expressed by the members of a social group as a code for social exchange, so they can name and classify unambiguously the various aspects of their world and their personal and group history".

Social representations underlie the construction of practical knowledge – or the common sense – as a product of all information disseminated by the media, cultural diffusers, academy, etc., debated in the various environments such as religious associations, workplaces, family and closer relations. Through a sharing process, what is initially unfamiliar becomes familiar and part of everyday life, for example, the reality described by science, technology, laws, etc., (Lefèvre, 2006).

Structurally, two main processes are involved in the formation of social representations. Firstly, the objectification explains how the individual comprehends the new object: firstly he/she selects and decontextualizes elements that will be represented, removing excess of information, since it is not possible to deal with the whole of the transmitted information. Prior knowledge, personal experience and values interfere in this processes and once cut-offs were made, the fragments are rearranged in a scheme that becomes the nucleus of a figurative representation, as "thinking with images" (Moscovici, 1988; Lefèvre & Lefèvre, 2014). In this sense, something abstract turns into something almost concrete.

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The second process in social representation, anchoring, gives meaning and brings the unfamiliar newness to the familiar territory through a process of comparison with a paradigm of a category that the individual thinks is appropriate to represent this new object. Then, the object acquires the characteristics of that category and is adjusted so that coherence between the novelty and what is already known is reached (Moscovici, 1988).

Based on the Theory of Social Representations a method for content analysis of personal interviews has been widely used in social research in Brazil and it is named Collective Subject Discourse (CSD) (Lefèvre, 2006). The CSD method assumes that social representations constitute the core of a collective discourse with the function of giving meaning to intangible things such as science facts, technology, and laws. So the CSD proposes that the shared ideas in a social group have both a qualitative dimension (descriptive) and a quantitative (frequency of occurrence), and it is thus considered a quali-quantitative technique (Lefèvre, 2006).

In this sense, the CSD guard similarity to the prototypical approach proposed by Vergès (1992) which analyzes the frequency and the evocation rank of the elements generated through a projective technique. Moreover, the CSD captures the language used by consumers that reflects how they rework the discourse of science on a given subject. The DSC and other techniques related to the Social Representations Theory have been extensively used in research on food (Bäckström, Pirttilä-Backman, & Tuorila, 2004; Behrens, Vedovato, Cervato-Mancuso, & Bastos, 2015; Onwezen & Bartels, 2013; Rodrigues, Ballester, Saenz-Navajas, & Valentin, 2015).

Despite the role of Brazil in the production of GMF crops, very few studies were published addressing the public perception about the topic. Much of the data is outdated and collected in the beginning of the 2000s when GMF production and the public debate on the subject were incipient (Instituto Brasileiro de Opinião Pública e Estatística, 2001; Instituto Brasileiro de Opinião Pública e Estatística, 2002; Oda & Soares, 2001). Besides, these works were not intended to understand the beliefs, values and knowledge of the public but just the favorableness to the production of GMF. Therefore, the present study was based on personal interviews to gain understanding on genetic engineering applied in food production and the CSD technique was used as a way of giving voice to Brazilian consumers.

2. Methodology

The study was conducted in the city of Campinas, the 11th largest metropolitan area in Brazil with 1,123,241 inhabitants, 98% of them living in urban areas. The city has a high human development index (HDI = 0.805) and accounts for nearly 3% of gross domestic product in the State of São Paulo (Agência Metropolitana de Campinas, 2014). Campinas is considered a test market for various types of consumer products due to its diversity and global urban standards.

The research project was approved by the Committee of Ethics in Research at the University of Campinas (CAAE 22851713.7.0000.5404).

2.1. Interview guide construction

It was made an extensive literature review to gain understanding about the main factors influencing consumers' views on GMF. The findings were used to construct the interview guide and concepts of biotechnology, genetic engineering, GMO and transgenics that were used during the interviews.

Afterwards, the guide and the concepts were submitted to experts in biotechnology who verified if the questions and concepts were relevant, understandable, capable of generating speeches and address the topics of interest, according to the methodology suggested by Di Iorio (2005).

A few interviews were done previously to verify if the objectives of the questions were being achieved and if the guide was actually

understandable by consumers. Since satisfactory results were obtained, interviews went on.

2.2. Interviews

Forty-eight individuals were interviewed at a leisure center during December 2013. This site was chosen due to the flow of individuals from different social classes, education and age. To be included in the sample they should be responsible for the choice and purchase of their own food and could not be professionals of marketing, advertising and biotechnology.

At the start, interviewees were informed about the objectives of the research and that the interviews would be audio-taped. Then, they signed a term consenting with the use of the records. Sociodemographic information was also collected according to the Economic Classification Criterion Brazil (Associação Brasileira das Empresas de Pesquisa, 2014).

Twenty to 30-min interviews were conducted using a guide (Fig. 1) containing six open questions with cognitive, attitudinal and behavioral approaches regarding the research topic, formulated to encourage discursive answers (Lawless & Heymann, 2010).

Fig. 2 shows the concepts of biotechnology, genetic engineering, GMO (genetically modified organism) and transgenic, which were presented to interviewees with illustrative images in order to stimulate them to state their views on these technologies.

For each question, probes such as "tell me more about that" or "what else?" were used to explore the interviewees' answers more deeply, if needed, and to provide contextual information for understanding the cognitive and behavioral dimensions. The records of the interviews were transcribed verbatim.

2.3. Collective subject discourse

The CSD comprised the following steps according to Lefèvre and Lefèvre (2014):

1) Identification of the key expressions: selection of excerpts from individual speeches that bracket the essence thereof, i.e., debugging all that was irrelevant or not essential.

2) Classification of the key expressions in central ideas: central ideas are names or linguistic expressions that briefly and accurately describe the meaning of the key expressions. Key expressions were grouped according to the analytical similarity with a certain central idea and for each central idea a synthesized speech was written in the first person singular, stablishing the CSD.

3) Identification of anchors: anchors are general statements from the original individual discourses that qualify a specific context, express a latent idea or manifest a theory, belief, value, feeling, etc.

Three different researchers with experience with the CSD technique evaluated the data resulting in a consensus between them in order to balance out the subjective influences of individual evaluations (Flick, 2004).

The Qualiquantisoft® software was used in the analysis (Instituto de Pesquisas do Discurso do Sujeito Coletivo, 2013). It permitted the input of the transcriptions so that central ideas, key expressions and anchor could be assigned to each respondent. Subsequently, the software calculated the frequency of each central idea which, in turn, was synthesized in a collective discourse. Considering the exploratory nature of the study, a cut off of about 10% of occurrence was considered to select the most salient central ideas among the respondents. Cut offs of at least 10% have been used to analyze qualitative data as means of selecting more relevant information (Ares & Deliza, 2010; Hough & Ferraris, 2010).

The final discourses generated were reviewed by the researchers to adequate them to the first person singular as well as to remove redundancies.