

Use of information systems and decision-making in a food agribusiness of Brazil

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ABSTRACT

This paper analyzes the decision-making process in a medium-sized food industry located in northern Brazil. The objective is to clarify how the monitoring and use of information by the main decision makers occurs. It has been revealed that decision makers act differently, the entrepreneur, the administrative decision maker, relies on various sources of decision-making information. Regarding decision making on the factory floor, the engineer has shown that he does not make use of support tools, the main decisions he makes are based on his own experience and skills.

Keywords–Agribusiness; Decision making process; Information monitoring; Information system

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I. INTRODUCTION

Information, one of the most precious resources available to organizations, is fundamental in improving processes as well as in decision making. Business activities daily require your human resources to make decisions, whether strategic, tactical or operational. According to [1], decision makers should have useful information about their surroundings, if possible, obtain performance measures or any other form of support to act appropriately, making technology resources essential in this process [2].

The good manager does not make decisions strictly based on his perceptions, beliefs and experiences; It uses information systems to control the day-to-day activities of the company, knows the results achieved, compares with previously defined goals, tracks their evolution over time, perceives trends and acts based on data and information [3].

The wide diversity of information coming from customers, competitors, suppliers and new markets has encouraged companies to adapt their information systems to facilitate the monitoring of the internal and external environments of the organization. In general, large companies have realized that the way to improve their performance is the good use of robust management information systems. However, many companies, especially small ones, are unaware or do not have access to this type of system and sometimes make wrong decisions based on the tradition and / or experience of the manager [4].

Based on this context and considering decision making as one of the most important functions of the business manager, the guiding question of the research is: "What are the characteristics of the decision makers of a food agribusiness in the state of Rondônia and what is the role of information systems and information monitoring in this process?". Starting from the research question, the article aims to unveil how management processes occur from the point of decision making. Through interviews with key decision makers of this case study, the research addresses issues related to Information Systems, Information Monitoring and Decision Making.

II. THEORETICAL FRAMEWORK

In this section, we will present the theoretical background regarding the theme discussed. There is no claim to exhaust the subjects addressed but bring enough elements that can support the achievement of the research objectives.

2.1 INFORMATION SYSTEMS

[5] conceptualize information systems (IS) as a set of interrelated components that collect, retrieve, process, store and distribute information. Its purpose is to enable the flow of information inside and outside the organization, make it available to stakeholders and facilitate management processes. According to [6], information systems have inputs (data, instructions) and outputs (reports, calculations), including people, procedures, and physical facilities. These can be formal, including

pre-determined procedures, with standard inputs and outputs and fixed definitions (such as a corporate accounting system), or informal, such as gossip networks within an office, a group of friends exchanging e-mails, social networks, etc.

According to [7] there are several levels of information systems and with peculiarities between them. The three main levels, listed by the authors, are:

- Operational level: The system must support the organization's elementary procedural flow (buy and sell, payroll, inventory control, and so on).
- Managerial (tactical) level: Commonly used for monitoring the activities of the entire organization, assists the structured and semi-structured decision-making process at tactical and operational level.
- Strategic Level: Subsidizes top management on strategic issues, high-impact, and often long-term decisions.

Currently, information systems are mainly used for management purposes, as presented below.

2.1.1 MANAGEMENT INFORMATION SYSTEM (MIS)

The Management Information System (MIS) should serve as a basis for tactical and operational planning, control and decision-making functions. In general, MISs provide summary data, issue reports, and condense information about company internal information [8], [9].

In practice, a good management information system should simply provide useful information about the company to its users [1]. However, according to [9], it is not enough that management systems have good usability, it is necessary to constantly feed data to the system. This is a factor that depends on the maturity of users, whether operational, tactical or strategic.

MISs are developed and directed to internal company issues, and their users are responsible for operations, usually daily, weekly or monthly. Routine use is related to decisions and structured guidelines, that is, situations that are not new to the organization and that require medium or little planning in actions [8], [10].

2.1.2 DECISION SUPPORT SYSTEM (DSS)

Also referred to as the Strategic Information System (SIS), is designed to facilitate decision making at strategic levels. According to [11], the decision support system streamlines decision-making processes, combining human decision-making skills with the integration of various sources of information.

According to [8], the integration of various data and information models seeks to solve semi-structured and unstructured problems that require intense user involvement. Among the characteristics

of a DSS, [11] highlights as an advantage the ability of these types of systems to allow integration with communication systems, management systems and other databases, examining alternatives quickly and being customizable in a way. according to the user's need.

It is important to highlight that systems do not exist without their raw material: information. Thus, the need arises to monitor the organizational environment to feed the systems with the necessary information relevant to the decision-making process, as discussed below.

2.2 MONITORING INFORMATION

Increasingly, managers are relying on methods, techniques and practices that involve the use and analysis of information [12] (p. 125). Monitoring information has become strategic for organizations, as with-it managers can understand the events of the internal and external environment of organizations, as well as facilitate the direction of actions [13].

These events arise in the organizational horizon in different ways, such as the emergence of new technologies, new businesses, new ways of working, new processes, new materials, which change the scenario of the organizational environment. For [14] (p. 64-68) organizations produce and use data, information and knowledge of different natures, produced outside the organization, with prospecting and informational monitoring being performed in both environments: internal and external. In order to define monitoring techniques, simple but important criteria must be observed, clearly defining details such as: frequency of monitoring, focus, constraints, relevance, scope and limit of what should be monitored.

Regarding environment monitoring, [15] states that organizational environment monitoring can be defined as the acquisition and use of information about events, trends and relationships in their external environment, as well as knowledge that will help managers plan future actions, including a wide range of personal and organizational activities. Moreover, it is a process of filtering a body of information for any need, meeting specific criteria and with different steps, such as: searching for information resources, selecting these resources, identifying criteria for monitoring, monitoring itself and determination of special actions to be taken in view of monitoring results.

Continuous monitoring, as a strategic activity within the organization, enables it to detect routine signal deviations, and detect early warning signals, minimizing duplication and maximizing the reach and efficiency of information gathering.

2.3 DECISION PROCESS

According to [10], decision making is the transformation of analyzed information into action. The decision-making process, according to [16], comes down to a logical flow in which the individual chooses the most appropriate option to solve a problem or seize opportunities.

Being an activity in which the human being is protagonist, the decision-making process is prone to errors. And to solve such problems and achieve better results, [17] mapped the decision-making processes: (1) problem identification, (2) enumeration of alternatives, (3) selection of the most beneficial option, (4) implementation and (5) monitoring (feedback) of the implemented option.

According to [1], administrative performance depends on the skills and dexterities developed by managers throughout their careers. These skills can be technical, which are related to the performance of human job functions, which consist in dealing with people, or conceptual, which consists in seeing the company globally, understanding the complexities of the organization and promoting the adjustment of the behavior of the employees. organization participants, which are shown in figure 1:

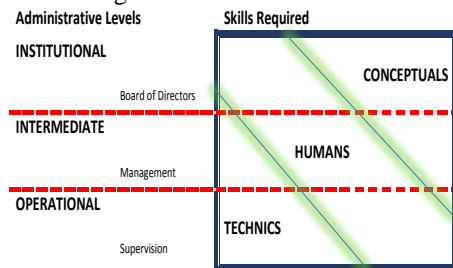


Figure 1: Management skills at management levels

Regarding decision-making structures, [18] state that there are two types. Structured (programmed) decisions: Easily resolved using algorithms and computers, occurs when the decision-making element can determine the relevant decision elements, or is based on a theory; And Unstructured (unscheduled): decisions usually require expert skill, when it is not possible to describe the relevant elements for decision making. Table 1 illustrates the characteristics of the decision types regarding: Decision Classification, Nature of Situation, Decision Environment, Decision Method and Decision Support Techniques.

DECISION	PROGRAM MED	NOT PROGRAM MED
Classification	Routine	Singulars
	Programmable	Innovative
	Recurrent	Specific
	Generic	
Nature	Well defined	Ambiguous
	Structured	Unstructured
	Static conditions	Dynamic Conditions
Environment	Accurate Information	Little information available
	Method	Rules
Procedures		Requires the interpersonal skills of the decision maker
Policies		
Supporting Techniques	Mathematical models	Decision Support Systems
	Spreadsheets	Scenario Analysis
	Estimates	Intuition
	Operational Research	Simulations

Table 1 - Characterization of decision-making

III. METHODOLOGICAL PROCEDURES

As for the methodological procedures, for the development of this work, was opted for a unique case study [19], as it seeks to study more deeply the role of information sources, with emphasis on information systems and in the business decision making process. Thus, the research is characterized as exploratory and descriptive, with a qualitative approach, using semi-structured interviews and documentary search as forms of data collection.

The object of study of the research was a food company located in the state of Rondônia that sells its products in the state itself and in Amazonas, Acre, and Mato Grosso. Serving wholesale and retail, agroindustry has in its portfolio several food products such as: flour, cereals, condiments and others, with rice being the main product. The company has a team of 150 employees, fitting in as a medium-sized company, according to the parameters adopted by SEBRAE.

The interviewees were the company's main decision makers, the owner partner (responsible for all administrative aspects) and the food engineer (responsible for the factory floor). Three perspectives of analysis were addressed: - information system; - information monitoring and - decision making. Table 2 illustrates the outline of the interview.

PERSPECTIVE	OBJECTIVE	VARIABLE
Information system	Identify what types of information systems the company uses and makes use of them for decision making	Information System Types
		Decision Support Systems
Information Monitoring	Verify which environments (indoor / outdoor) are monitored and how this occurs	Source of Information
		Quality of Information for Decision Making
Decision making	Understand the decision-making process in the company at the administrative and productive levels.	Decision Type: Planned and Unplanned
		Decision making steps

Table 2 - Interview design

IV. DATA ANALYSIS AND DISCUSSION OF RESULTS

In order to facilitate the data analysis, the information from the interviews was compiled and organized within the topics outlined in Table 2. The following are the results obtained in the interview. The first perspective aimed to identify which are the information systems used by the company studied. From the perspectives of Information Monitoring and Decision Making, respectively, are analyzed which environments decision makers monitor information and how the decision-making process occurs.

4.1 INFORMATION SYSTEMS

In this topic, we sought with the interviews to explore which information systems are used by managers, where the illustrative fragments of the interviews portray the main positions of the company's decision makers regarding the system used and the use for decision making.

Regarding the information systems used, it was found that the company recently underwent an

information system exchange. The owner informed that in order to expand and professionalize the company's activities there was a need to change the system, as it was having difficulty in controlling business processes, especially in financial control. The entrepreneur's speech is in line with the literature, because for the authors [20] it is important that the information system meets the business. [10] and [21] complement by stating that Information Systems must support the main business activities - productive and accounting.

As part of the use of information systems for decision-making, the entrepreneur stated using unstructured spreadsheets and reports. This is because the old system does not offer enough resources, and as they are still in the training and learning phase for handling the new system, these practices remain.

The food engineer does not make use of the software for decision making; It uses tradition and experience to solve daily problems that it is responsible for. This statement is in line with what is explained by [10], stating that programmed decisions are those that aim to solve known problems and faced by the company continuously, not requiring a deeper analysis of context and environment by the decision maker. By fitting your own experience and cognition make the most assertive choice.

4.2 MONITORING INFORMATION

This topic aimed to address what are the other sources of information (besides software) used by respondents in decision making. We also questioned the quality of the information used in decision making.

In this topic it was noticeable that decision makers monitor information in a hybrid way (internal and external sources). In the process of buying raw materials, the entrepreneur uses internal sources for negotiations, such as purchase histories and budget with other suppliers. Monitoring information for the sale of your products is also from internal sources, such as your customers' default rate. The administrative manager also monitors informal sources such as social networks, internet news and government sources.

On the factory floor, the engineer says that information monitoring is mainly linked to the development of new products, which seeks external information with colleagues and scientific sources.

In summary, the information monitoring practices in the studied company can be separated into: strategic decision making and routine decision making. That is, when the company faces a problem, or needs something that generates higher costs and risks, the information sought requires greater reliability. In production, informational monitoring

is focused on innovation. According to [12], managers are increasingly relying on practices that involve the use and analysis of information to solve organizational problems, with information monitoring being the key to the organization's success. In the case studied, it is evident that the care with the reliability of information is directly proportional to the costs and risks that decision making will have for the company.

4.3 DECISION-MAKING PROCESS

Finally, this topic explores how the decision-making process occurs in the organization. It was realized that the company's operational decisions are more closely linked to the decision maker himself and sometimes to internal information sources. When decisions are more strategic and the consequences create risks for the company, the decision-making process is centered on the entrepreneur, who relies on internal and external resources to expand possible alternatives.

According to [22], [13] and [23], decision-making takes place in gradual steps - Situation identification, situation analysis, definition of objectives, detection of alternatives to their attainment, decision making and evaluation of results / consequences. In the studied industry, the decision-making flow resembles the model of the authors, being well defined the stages of the decision-making process, however the post-decision monitoring process is incipient and, in most cases, made of informal way. The manager makes greater use of the information system for control in the sales sector, using some financial indicators and collecting feedback from his supervisors regarding the progress of their sectors.

Regarding the types of decisions (structured and unstructured), company decisions are well defined. In operational level (factory floor) decisions, decision makers require little informational support, routine is already known, and potential problems as well, with the decision maker's skill and experience playing a key role in this process. The most complex decisions, especially at strategic levels, are centered on the business owner, who makes use of the information system, meetings with employees, data from government entities and, in some cases, expert consultations (cited in the topic "monitoring information").

These characteristics are presented in the works of [24], [25], who state that operational decision-making routines are structured, more accessible and with a more accurate description of the problem. In unstructured (usually strategic) decisions, it is not possible to specify the situation or purpose in advance, as they require greater caution and depth in context analysis prior to decision

making and are directly related to the higher levels of organizations.

4.4 CASE STUDY DECISIONAL CHARACTERISTICS

In order to condense the topics covered in the interviews and simplify the visualization of the interviewed characteristics in relation to business decisions, the matrix with the decision characteristics of the interviewed Entrepreneur and Engineer was built.

	Strategic Decisions (Unstructured)	Operational Decisions (Structured)
Businessman	Uses ERP software	Low Software Usage
	Monitors external data from formal and informal sources	Poor information monitoring
	Most decisions are based on information	Decisions Based on Experience
Engineer	External sources	Internal Sources
	Information quality is very important	Poor information monitoring
	Decisions rely little on administrative	Decisions Based on Experience

Table 6 - Decisional characteristics of the case study

V. FINAL CONSIDERATIONS

This case study provided insight into how an average food industry develops its informational processes by addressing the topics: Information Systems, Information Monitoring and Decision Making.

It was possible to notice that there is a centralization of operations in the main decision makers, that is, the company has a strong dependence on the rationality of the decision makers for the operational and strategic management of the company, a fact that, according to [26], contributes to a minimization of organizational competitiveness.

Regarding information systems, it was found that managers are in the learning phase due to the implementation of new software, and that information monitoring varies according to the situation, as well as the search for external information that, regardless of the sources (internal, external) and type (quantitative, qualitative) are adjusted according to the need of the entrepreneur.

When approached about the availability and quality of information, respondents did not show lack of consistency in the information they have. The businessman confirmed that his information-based management is enough to conduct the business, but said he is looking for ways to map and standardize information sources and how they

should be evaluated. Finally, the business owner signaled efforts toward professionalization of the company by exchanging the information system and hiring consultancies to create an internal board of directors. Such initiatives aim to alleviate the dependence of their presence on decision making, enabling greater dedication to the company's strategic affairs.

For future studies, it is recommended to expand the research object, using other industries, whether they are in the same segment or not, so that there is the possibility to make a comparison with the use of information systems. If companies from the same industry or segment are used, it can be verified if the use of information systems interferes with the position that the company occupies in the national scenario, based on revenues, for example, or use another type of ranking that allows make this comparison.

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