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IMPACT OF QUALITY MANAGEMENT SYSTEM ON RESPONSIBLE FOOD PRODUCTION

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Purpose: The aim of the article is to obtain an answer to the research question "What is the level of impact of each of the eight selected aspects of the ISO 9001 QMS on three selected reference areas defined in relation to the tasks assigned to one of the sustainable development goals, which is Responsible Production and Consumption?
Design/methodology/approach: The study was conducted on 26 enterprises of the food industry in the meat sector. The research tool was a questionnaire. Google Form was used for the study, while ensuring anonymity. Descriptive statistics was used to analyze the study results. The scope of the article includes the theoretical background, a description of the research methodology, presentation of the study results, analysis of the results and conclusions.
Findings: The study confirms the importance of quality management systems in promoting sustainable development in companies. The study shows that implementing a quality management system has a significant impact on reducing food losses during production, promoting local products and using ecological waste management practices. Respondents emphasized the importance of top management involvement in the process of implementing a quality management system and measuring the results achieved by the company.
Research limitations/implications: The directions of future research may be diverse and cover many areas in the field of responsible production and process standardization. Research limitations may be related to lack of trust, lack of knowledge about the structure of management systems, or employee concerns about management evaluation. High priority importance in the scope of the issues raised should be assigned to the topic of food safety culture.
Originality/value: According to the Web of Science database the topic of "quality management systems and responsible food production", there are 108 publications (taken up indirectly) and none of the articles presents research results in the scope taken up in this study. The article may be addressed to entrepreneurs who are participants in the food chain and researchers who want to develop the subject.
Keywords: quality management systems, responsible production, sustainable development, improvement.
Category of the paper: Research paper.

1. Introduction

Standardization is an activity aimed at achieving the optimal (in given circumstances) degree of order within a given scope by establishing provisions intended for common and repeated application, relating to existing or potential problems (Act of 12 September 2002 on standardization). The purpose of standardization may be to develop process flow patterns, standardize selected purchasing parameters, or define required behaviors. The scope depends on the goal that has been adopted and may include one element or product parameter, or many parameters or activities of the entire organization (Frąś, 2015).

The international standard ISO 9001, which is the basis for implementing the Quality Management System ISO 9001 (QMS), is one of the most popular standards, with compliance confirmed by external certifications. The popularity of this quality management system results from many factors, including the organization's focus on the customer and meeting their requirements, and the general nature of the standard, which means that its requirements can be implemented not only by manufacturing companies, but also by service companies, local government units, or business organizations. Due to the general nature of the requirements of the above-mentioned standard, the quality management systems implemented in individual companies may differ significantly in terms of the method of implementation, form, and scope (Clacer-Cortes, 2007; Tarí, Molina-Azorín, 2010). The ISO 9001 standard presents in its content a set of requirements, both general, which apply to the entire organization, as well as detailed ones concerning individual areas of management in the company, including: the context of the organization, leadership, planning, support, operational activities, evaluation of the effects of action, and improvement.

The high level of competition and the continuous development of companies in the food industry require continuous improvement and the introduction of better and better solutions. Companies strive to improve work organization and achieve greater customer satisfaction, which is crucial to achieving business success, but provided that the quality management system is reliably implemented, which is a demanding and time-consuming process (Szatkowski, 2014). In the literature, the benefits of introducing a QMS are most often divided into two groups: internal and external (Ružele, Zgirskas, 2021). The internal benefits of functioning quality management systems include (Adomaitiene et al., 2022):

- increased involvement of the company's employees in the performance of assigned tasks at all levels of the organization,
- improving the operation of the decision-making system and the flow of information,
- organizing the basic areas of the organization's activities, such as marketing, production, planning, etc.,
- establishing clear powers and tasks of organizational units,

- ensuring repeatable products, which directly translates into a lower frequency of complaints,
- significant reduction of operating costs and increase in production diversity through appropriate management of processes in the organization,
- better identification of the needs of individual organizational units,
- improving the way threats and their effects are identified - the possibility of risk management,
- implementation of a training effectiveness assessment system and a periodic employee evaluation system,
- improving the effectiveness of achieving the organization's goals,
- motivation to improve the functioning of the organization,
- shaping a culture of quality and effective internal communication.

The external benefits of quality management systems are as follows (Hamrol, 2017; Psomas et al. , 2014):

- greater credibility in the eyes of the customer, especially on foreign markets,
- significant improvement of the organization's image,
- increasing the competitiveness of the organization on the market,
- reading and analysing signals coming from the market, thus improving communication between the organisation, the customer and the supplier,
- systematizing the methods of confirming and executing customer orders,
- the ability to compare yourself with other organizations in terms of analyzing the results achieved,
- easier contact with the organization's environment: state institutions, banks, competitors and cooperators on the foreign market.

In the case of the food industry, the benefits of introducing a QMS mainly concern the prevention of hazards related to product safety. In addition, thanks to the QMS, it is possible to ensure the repeatability of the product, the awareness and knowledge of employees are raised and their efficiency is increased. It also influences the improvement of the processes used and their continuous improvement, as well as increasing the efficiency and transparency of the organization's operations. All this makes consumers certain that the products are manufactured in a safe and hygienic manner, which significantly increases customer trust. Moreover, the introduction of a QMS also facilitates international food trade (Kędzior, Prasińska, 2005).

The introduction of QMS is also associated with many difficulties. During the implementation process, companies encounter many barriers and challenges. It is a mistake for management to plan too many changes in too short a time, which may result in a lack of acceptance on the part of employees and contribute to making mistakes and superficial performance of tasks. In the phase of achieving goals, barriers related to communication within the organization may occur. Psychological barriers among management and employees are also

an important element. Most of them result from fear of the unknown and the lack of ability to cope with new situations (Dobrowolska, 2003; Gnilakiewicz, 2017). In the food industry, according to survey research conducted by A. Kaźmierczak and D. Kołożyn-Krajewska (2010), the difficulties include:

- change in employee mentality (59%),
- problems with truly understanding the rules of the system (42%),
- too little financial outlay for system implementation (42%),
- lack of time for employee training (26%),
- lack of GHP/GMP rules (21%),
- inability to identify real threats (20%),
- too many critical points designated (12%).

Difficulties often result from the fact that many people imagine the introduction of a quality management system as a continuous inspection, not realizing how important a role it plays in the effective production of safe food, which is important, among others, in the context of sustainable development (Walaszczyk, 2016).

The idea of sustainable development is an important element of international law. The most important international documents describing the issue of sustainable development include Agenda 2030 and the Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters. In Poland, the principle of sustainable development has gained constitutional status and has been included in Article 5 of the Constitution of the Republic of Poland, and the definition of sustainable development is included in the act entitled "Environmental Protection Law". It states that it is "such socio-economic development in which the process of integrating political, economic and social activities takes place while maintaining natural balance and the durability of basic natural processes, in order to guarantee the possibility of meeting the basic needs of individual communities or citizens of both the current generation and future generations".

The 2030 Agenda for Sustainable Development lists, among others, the following tasks under Responsible Production and Consumption:

- implement sustainable consumption and production programmes for all countries,
- ensure sustainable management and efficient use of natural resources,
- halve the global amount of food wasted per capita in retail and consumption, reduce food losses during production and distribution, including losses occurring during harvest,
- significantly reduce waste generation through prevention, reduction, recycling and reuse,
- encourage companies, especially large and international ones, to implement sustainable development practices and include information on this in their regular reports,
- support developing countries in strengthening their scientific and technological capacities to create more sustainable consumption and production patterns.

The foundations of sustainable production are based on linking the production process with the concept of limiting the use of resources and the environmental impact of the product. This concept therefore refers to all stages of the product life cycle – from design to the end of its life (Czaplicka-Kolarz, Kruczek, 2013).

The PARP report shows that entrepreneurs are more likely to take action to promote sustainable production. 50% of respondents say they encourage customers to make informed purchasing decisions, 27% say they educate customers and suppliers on social and ecological responsibility, and 21% include relevant information on the impact on the environment on labels. The meat industry in particular has attracted a lot of attention from scientists. Meat and its production have become a controversial topic in public debates because it covers many aspects of sustainable development. Meat leaves a much larger climate footprint than plant-based food (Arneth, Rabin, 2019). Meat consumption is one of the most frequently discussed topics in broader public debates on sustainable food systems, climate change, and healthy eating, which, due to the huge interest of people, encourages even more research and analysis (Sanford et al., 2021). In the Polish agri-food industry, the meat and dairy sector is one of the main sectors of animal production. According to the estimates of the Polish Meat Association, the meat industry in Poland employs over 100,000 people in slaughter and processing and 1 million people in agriculture. Meat and milk are the main goods exported to EU countries, which is why they must meet not only a number of requirements in force in our country, but also those abroad. The negative health impacts of meat and ethical beliefs are driving more and more people to become vegetarians, replacing it with plant-based and lab-grown meats, which are considered a more sustainable option (Dolgin, 2020; Thompson, 2017). Despite this, global meat consumption continues to grow, with particularly high growth in low- and middle-income countries. It is worth mentioning that meat production requires significantly more land and water than plant-based food production, and as a result has a greater impact on the environment and climate (Desiere et al., 2018; Lynch et al., 2018; Lynch et al., 2020). It is necessary to educate and build awareness from the youngest generations (Johnston et al., 2019; Vainio, 2019; van der Weele et al., 2019). In addition to changes on the consumer side, technological improvements will also be needed to make the production of meat products more sustainable. However, it should be borne in mind that the transformation of systems into more sustainable ones requires many institutional, legal, behavioral, and technological changes at various levels (Afsana et al., 2021).

The aim of the article is to obtain an answer to the research question posed as a result of the review of the subject literature: *What is the level of impact of each of the eight selected aspects of the ISO 9001 QMS on three selected reference areas defined in relation to the tasks assigned to one of the sustainable development goals, which is Responsible Production and Consumption?*

The aspects of the ISO 9001 QMS being examined are:

1. Conducting analyses of the external and internal context of the enterprise.
2. Management based on a process approach.
3. Involvement of top management in the implemented processes.
4. Involvement of employees in the implemented processes.
5. Risk management in relation to the implemented processes.
6. Planning of operational activities.
7. Traceability of products.
8. Measurement of the effects of activities.

The reference areas of Responsible Production and Consumption (RPC) are:

1. Reducing food losses in the production process.
2. Promotion of local products/raw materials.
3. Ecological waste management.

2. Methods

Research subjects

Due to the controversial nature of the meat industry's impact on sustainable development issues, in particular in the area of Responsible Production and Consumption, it was decided to refer to companies belonging to the meat sector of the food processing industry. The study was aimed at employees of the meat industry, mainly employees of the quality department and technologists. The research sample was purposive, which means that a selected group of companies from the adopted location and industry and industrial sector was included in the study. The companies in which the respondents work are located in the Greater Poland Voivodeship and Lodz Voivodeship. 26 out of 90 companies, with representatives of which contact was established by phone or e-mail, expressed their willingness to participate in the study. The study included companies mainly involved in slaughter and cutting of meat and the production of meat products. The average time of operation of the surveyed companies on the market is about 24 years. Five of the surveyed companies declare that they have been operating on the market for 30 years. 16 companies participating in the study have been operating for less than 30 years. Only five companies are more than 30 years old. The entities participating in the study can also be classified according to the size of the companies: 31% are companies employing 50-249 employees and more than 250 employees, 27% are companies employing 10-48 employees and 11% are companies employing 1-9 employees. 85% of the companies participating in the study declared that they have management standards, while 15% do not have any management standards - these are mainly micro and small enterprises. Among the management standards that the companies have, they most often mentioned: ISO 9001 (Quality

Management System), ISO 14001 (Environmental Management System) and HACCP (Food Safety Assurance System).

Research tool

The survey was conducted using Google Form, ensuring anonymity. The survey questionnaire consisted of nine questions. At the beginning of the survey, the company's profile was placed, which included questions (1-5) concerning, among others, the company's time of operation on the market, the number of people employed in the company, and the management standards introduced in the company. The next questions (6-8) were aimed at checking to what extent (on a scale of 1-5) the respondents assessed the company's responsibility towards: ensuring consumer safety when consuming manufactured products, ensuring consumer health from consuming manufactured products and environments.

The key question in the survey questionnaire was the last question, in which a selected point had to be marked from a scale of 1 to 5, where 1 means – minimal impact of a given QMS aspect on a given RPC area, 2 – small impact of a given QMS aspect on a given RPC area, 3 – medium impact of a given QMS aspect on a given RPC area, 4 – large impact of a given QMS aspect on a given RPC area, 5 – very large impact of a given QMS aspect on a given RPC area. The following areas of reference were mentioned: reducing food losses in the production process, promoting local products/raw materials and ecological waste management. The aspects examined were conducting analyses of the external and internal context of the enterprise, management based on the process approach, involvement of top management in the implemented processes, involvement of employees in the implemented processes, risk management in relation to the implemented processes, planning of operational activities, traceability of products and measurement of activity effects.

Research methodology

The initiation of the study began with a reference to the existing state of knowledge. For this purpose, the literature review method was used. This process aimed to provide a comprehensive and up-to-date summary of knowledge on the impact of quality management systems on sustainable development. After reviewing the research results in the field of responsible production in Poland and worldwide, with particular emphasis on the food industry, it was found that the meat industry has the least published research. After identifying the research gap, the purpose of the study was determined. Then, the area in which the study would be carried out was selected, after which a list of companies with contact information was determined and the research method was selected.

For the purposes of the study, a primary data collection technique was used – a questionnaire survey. The study took about six weeks. The study involved 26 companies out of 176 located in the Greater Poland Voivodeship and Lodz Voivodeship, which is about 15%. With this number of respondents, descriptive statistics was used, calculating the average values of the indications. After collecting the responses from the survey, the data was exported to an Excel spreadsheet, which allowed for easier data management and processing. It was ensured that all

the necessary data, questions and answers were correctly recorded and included in the exported file. After importing the data into the program, the data was prepared for further analysis, incorrect, incomplete answers were removed and the data was properly sorted. After preparing the data, its analysis was started. The relevant data was filtered and sorted, arithmetic averages were calculated from them, and tables were developed for grouping the data. In order to visually present the research results, the Excel charting function was used.

3. Results

In terms of the company's responsibility to ensure consumer safety from consuming manufactured products, respondents were asked to mark an answer on a scale of 1-5, where 1 means very low, 2 - low, 3 - average, 4 - high, and 5 very high responsibility. The results of the study showed that respondents rated their company's responsibility to ensure the safety of consuming manufactured products very highly - as many as 80.8% marked the highest answer on the scale - 5 and 19.2% - rated the responsibility as 4. In terms of the company's responsibility to ensure consumer health from consuming manufactured products, the answers were not as clear as in the case of the previous question. 57.7% of respondents marked an answer on a scale of 5, 38.5% - answer - 4, and 3.8% - answer 3. The responsibility of companies towards the environment was rated as the highest (5) by 42.3% of respondents, 50% - answer - 4, and 7.2% - answer 3.

In the main part of the study concerning the impact of each of the eight selected QMS aspects on three selected reference areas defined in relation to the tasks assigned to one of the sustainable development goals, which is Responsible Production and Consumption, the respondents had to mark the level of impact of the aspect on a scale of 1-5 . In order to present the results of the study in a coherent way - based on the assigned values on the scale - an arithmetic mean was calculated in relation to the eight examined QMS aspects. Fig. 1 shows the impact of the examined QMS aspects on reducing food losses in the production process, Fig. 2 shows the impact of QMS aspects on the promotion of local products/raw materials and Fig. 3 shows the impact of QMS aspects on ecological waste management. The analysis of the study results is presented in the Discussion section.

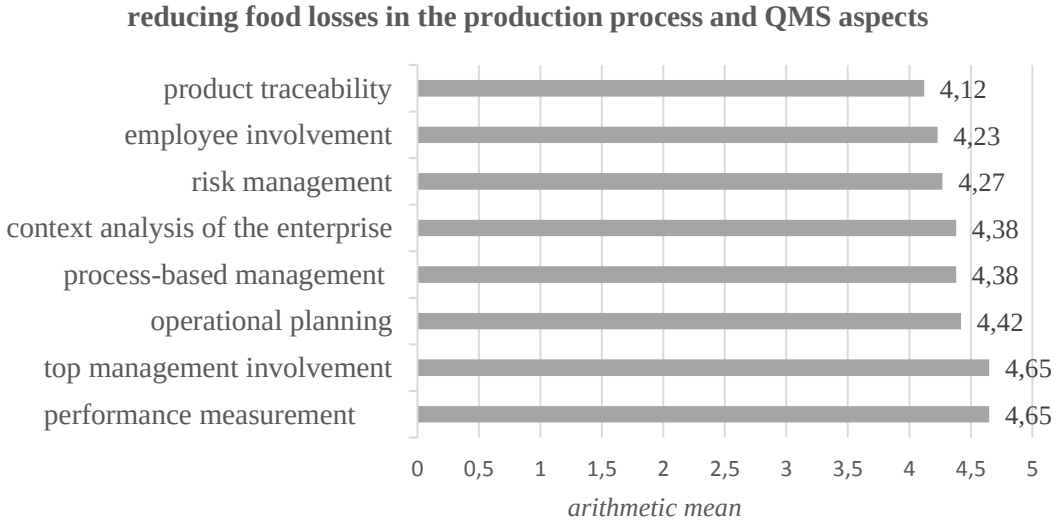

Figure 1. The impact of QMS aspects on reducing food losses in the production process.
Source: own study based on own research.

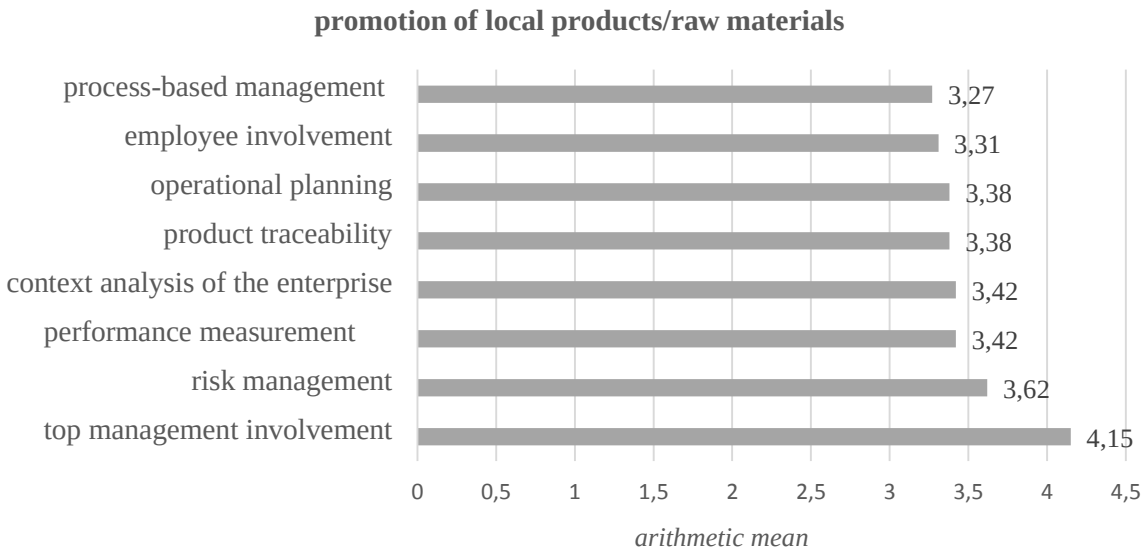

Figure 2. Impact of QMS aspects on the promotion of local products/raw materials.
Source: own study based on own research.

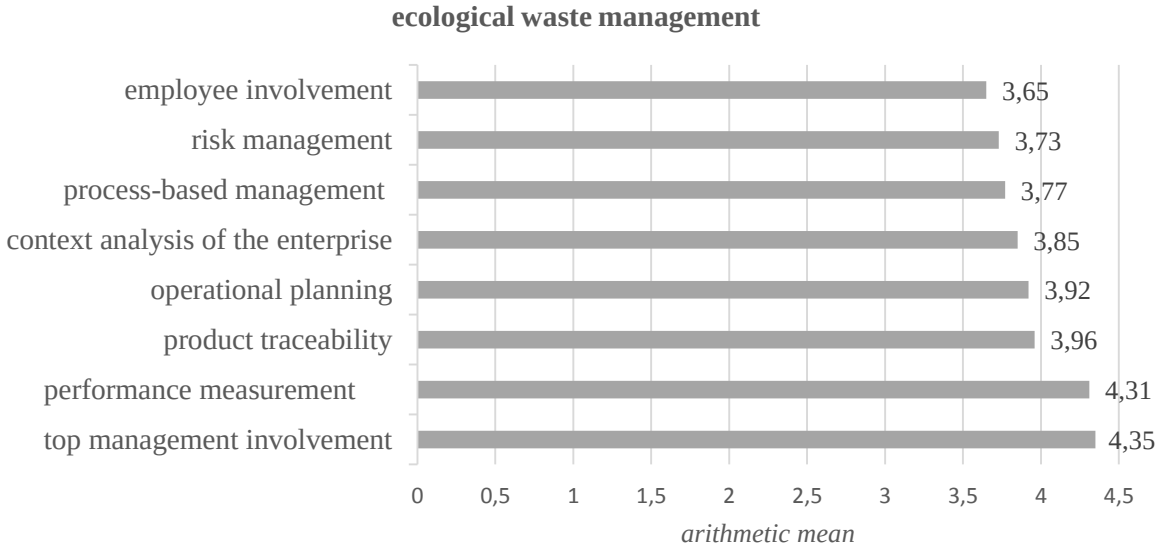

Figure 3. The impact of QMS aspects on ecological waste management.
Source: own study based on own research.

4. Discussion

The first of the areas analyzed was "reduction of food losses in the production process" in relation to eight selected QMS aspects. All the QMS impact aspects examined obtained an arithmetic mean above 4 in this respect, which means that the respondents believe that each of them has a significant impact on reducing food losses. According to the respondents, the greatest impact on reducing food losses in production is equally exerted by the measurement of the effects of activity (4.65) and the involvement of top management in the implemented processes (4.65), while the smallest (although still high) is traceability of products (4.12).

The area of "promotion of local products and raw materials" received significantly lower scores than the area of "reduction of food losses" analyzed above, which indicates that respondents claim that QMS aspects have a medium impact on the promotion of local products as one of the areas of Responsible Production and Consumption. Only one aspect achieved an arithmetic mean (out of the scores awarded on a scale of 1-5) above 4 and that was "involvement of top management in the implemented processes" (4.15). The lowest score was recorded for the aspect of "management based on a process approach" (3.27).

"Ecological waste management" has higher results than "promotion of local products/raw materials", but lower than "reduction of food losses in the production process". Ecological waste management is most influenced by the involvement of top management in the implemented processes (4.35) and measurement of the effects of activity (4.31). The lowest - by the involvement of employees in the implemented processes, which is a very surprising

result. Low arithmetic means resulting from the awarded ratings on the scale - in the case of ecological waste management, may indicate insufficient awareness of entrepreneurs about the impact of production on the natural environment and ecology.

The detailed analysis of the survey results relating to each of the eight selected aspects of the quality management system is presented below.

The impact **of conducting analyses of the external and internal context** on reducing food losses in the production process was assessed by 46% of respondents as large and very large – 46%. Only 8% considered this impact as medium. The impact on the promotion of local products/raw materials was assessed by 38% of respondents as medium, and 35% as large. Four respondents indicated a small impact, which constitutes 15% of the answers, and only three very large – 12%. However, in the case of ecological waste management, the response indicating a large impact of conducting analyses of the organizational context is much higher, as 58% of the respondents indicated this answer. Medium and very large impact was indicated by 15% and 19% of the respondents, respectively. On the other hand, small and minimal impact was indicated by two people, which constitutes only 8% of all answers.

The impact **of management based on the process approach** on reducing losses in the production process was assessed by 92% of respondents, as well as in the case of conducting analyses of the internal and external context – as large 46% and very large 46%. Only two respondents indicated that the impact is medium, which is 8% of all responses. The strength of the impact on the promotion of local products and raw materials was assessed by 54% of respondents as medium, by 15% as small, by 19% as large and by 12% as very large. On the other hand, the impact on ecological waste management was considered by 58% as large, 19% as medium and 15% as very large. Only 8% consider this impact as minimal and small.

The impact of **top management involvement** in the implemented processes on the three reference areas was assessed mainly as high and very high. The impact on reducing losses in the production process was mainly assessed by respondents as very high - 73%. 19% of respondents indicated a high impact, and only 8% an average impact. In the case of promoting local products/raw materials - 54% of respondents indicated a high impact, 31% a very high impact and only 15% an average impact. A very high impact of the aspect of top management involvement on ecological waste management was indicated by 54% of respondents, 27% a high impact and 19% a medium impact.

The impact of **employee involvement** in the implemented processes on the three reference areas was not assessed as consistently by the respondents as the impact of management involvement. A very large and large impact of employees on reducing food losses in the production process was indicated, which constitutes 84% of all responses. There were also responses indicating a medium impact - 12% and a minimal impact - 4%. In the case of the area of promotion of local products and raw materials, the responses according to the respondents are very diverse. One respondent indicated a minimal impact, five respondents indicated a small

impact, nine indicated a medium impact, seven indicated a large impact, and four indicated a very large impact, which constitutes 15% of all responses. Also in the case of the question about ecological waste management, the responses differ significantly - 38% of respondents indicated a large impact, 27% indicated a medium impact, and 23% indicated a very large impact. 8% of respondents indicated a minimal impact, and 4% indicated a small impact.

The impact of **risk management** in relation to implemented processes on reducing food losses in the production process was assessed as high by 58% of respondents. The second most common response was the one concerning a very high impact – 35%. Medium impact was indicated by only 8% of respondents. The impact on the promotion of local products and raw materials was assessed mainly by respondents as medium – 42% and high – 42%, which constitutes 84% of all responses. 12% indicated a very high impact, and only 4% small. On the other hand, the impact of risk management on ecological waste management was assessed as high by as many as fourteen respondents, which constitutes more than half of all responses – 54%, 25% indicated a medium impact, 15% a very high impact, and small and minimal impact were indicated by 4% of respondents each.

The impact **of planning operational activities** on reducing food losses in the production process is very high for thirteen respondents - 50%, and high for eleven - 42%. Only 8% indicated a medium impact. The impact on the promotion of local products/raw materials according to five respondents is low -19%, ten medium -38%, seven high -27% and four very high - 15%. In the case of the third reference area, as many as 54% of respondents indicated a high impact, 23% very high, 15% medium and 8% low.

Product traceability has a large impact – 42% and a very large impact – 38%. 12% indicated an average impact, and only 8% a small impact. The impact on the promotion of local products/raw materials was assessed by 70% of respondents as average – 35% and large - 35%, a small impact was indicated by five respondents - 19%, and a very large impact by only three - 12%. As for the third reference area, as many as half of the study participants assessed the impact of product traceability on ecological waste management as large, 27% very large, 15% medium, and 8% small.

The vast majority, as many as 20 respondents, claim that **measuring the effects of action** has a very large impact on reducing food losses in the production process, which constitutes over 75% of the responses. The remaining respondents indicated a large impact - 12% and a medium impact - 12%. In the case of promoting local products/raw materials, 10 respondents indicated a large impact, and 9 medium impact, which gives over 70% of all responses. 12% of respondents indicated a very large and small impact, and only one respondent indicated a minimal impact. A very large impact on ecological waste management was indicated by 14 respondents (over 50%), 27% indicated a large impact, 15% medium impact, and 4% small impact.

The study showed that more and more companies, not only large ones, but also smaller ones, declare that they have a quality management standard. The respondents also showed a high assessment of the responsibility of companies to ensure the safety of their consumers. Additionally, the respondents emphasize the importance of the responsibility of companies to ensure the health of consumers by offering high-quality meat products. Consumers care about the quality of food that meets the required standards regarding composition, nutritional value, and is free from harmful substances. The respondents also claim that companies are to a large extent responsible towards the environment. Issues related to environmental protection, such as reducing greenhouse gas emissions, minimizing water and energy consumption, and rational waste management, are key in the case of sustainable development. The study shows that implementing quality management systems has a significant impact on reducing food losses during production, promoting local products and materials, and using ecological waste management practices. Respondents emphasized the importance of top management involvement in the process of implementing a quality management system and measuring the results achieved by the company. The monitoring and measurement process is multi-faceted and its proper implementation significantly improves the efficiency of the functioning of enterprises, both within the internal and external context - including aspects of sustainable development (Walaszczyk, Mnich, 2024).

5. Summary

The research allowed us to obtain an answer to the research question *What is the level of impact of each of the eight selected aspects of the ISO 9001 QMS on three selected reference areas defined in relation to the tasks assigned to one of the sustainable development goals, which is Responsible Production and Consumption?* The research confirms the importance of quality management systems in promoting sustainable development in enterprises and provides a basis for further research in this area. The directions of future research related to sustainable development in the meat industry in the context of using multi-aspect management tools may be diverse and cover many areas. Research on this subject is a relatively new area of research (especially in Poland), which results from the growing ecological awareness and interest in the impact of meat production on the natural environment. According to the Web of Science database and the query conducted regarding the topic of "quality management systems and responsible food production", publications on the given topic (taken up indirectly) occur in the number of 108. Figure 4 presents the distribution of these publications according to the areas/sciences to which they refer.

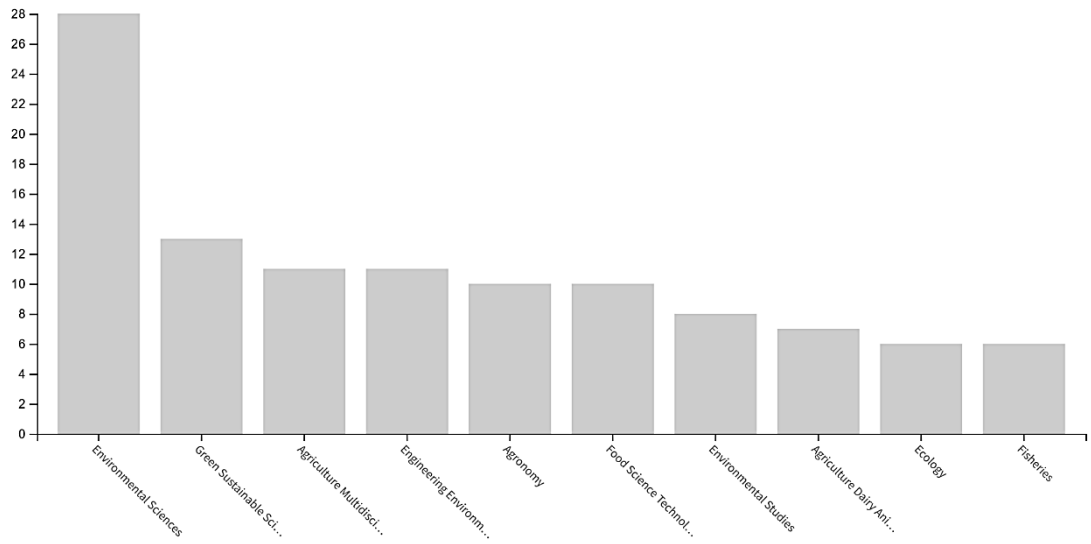

Figure 4. Query results for publications within the topic "quality management system and responsible food production".

Source: citation report from www.webofscience.com.

Due to the issues being addressed, however, it is necessary to bear in mind the possibility of research limitations related to the lack of trust, lack of knowledge regarding, for example, the structure of management systems or concerns about the assessment by management. High priority in terms of the issues being addressed should be assigned to the topic of food safety culture (Walaszczyk, Mnich, 2021).

The introduction of a sustainable management approach is not only socially responsible, but also contributes to the long-term success of the organization, strengthening its reputation, improving efficiency and creating greater value for stakeholders. It is therefore worth conducting research and developing quality management systems and food safety assurance and management systems that will serve to promote sustainable development at various socio-economic levels.

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