

Preference Analysis of Formal and Informal Information Sources in Decision Making of Managers in SMEs

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Article Info

Article type:
Research Article

Article history:
Received January 28, 2022
Received in revised form April 18, 2022
Accepted June 5, 2022
Published online June 25, 2022

Keywords:
Business information, Managers, Decision-making, Information types, Formal information sources, Informal information sources, Internal information sources, External information sources, Small and medium enterprises

ABSTRACT

Objective: This survey aimed to determine the priorities of formal and informal sources of information for decision-making among managers of small and medium-sized enterprises (SMEs) in the Jey Industrial Zone (Shahrak-e Sanati-e Jey) in Isfahan, Iran.

Materials and Methods: This quantitative research was done as a descriptive survey to determine the priorities of formal and informal sources of information for decision-making among managers of small and medium industrial enterprises. Jey Industrial Zone (Shahrak-e Sanati-e Jey) was selected for the study with 183 industrial enterprises, and 124 industrial enterprises were selected as the sample. Data was collected via a researcher-designed questionnaire. The validity of the data gathering tool was confirmed by the content validity method, and the reliability was determined using the Cronbach's alpha internal consistency coefficient, with a result of 0.93. Data analysis was performed using SPSS software.

Results: Technical information, information on the competition, and customer information are the types of information used in decision-making by managers in SMEs. Past documents archives, annual reports, and mission, vision, and goals of the industrial enterprises had the highest priority in internal and formal information sources and search tools, websites, web blogs, etc., and special books had the highest priority in external and formal sources. Knowledge and personal information (based on experience), experts, and colleagues had the highest priority in using informal sources.

Conclusion: It can be concluded that managers in SMEs in Isfahan prefer internal formal information sources rather than external sources. Thus, there is a difference between the amount of internal and external sources usage. It is also revealed that informal information sources are used more than formal information sources in decision-making by managers in SMEs in Isfahan. Moreover, managers in middle-sized enterprises use informal information sources more than managers in micro and small enterprises.

Cite this article: Karimian, P., Noruzi, A., & Nazari M. (2022). Preference Analysis of Formal and Informal Information Sources in Decision Making of Managers in SMEs. *Informology*, 1(1), 85-102.



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Publisher: Informology Center.

Introduction

Small and medium-sized enterprises (SMEs) make up a significant portion of national economies. The success of these SMEs depends on management techniques and decision-making processes used by their managers. Information is the basis of all decision-making, and many managers in SMEs lack systematic information skills. Information professionals do not have enough knowledge or understanding regarding the information needs of potential users such as industrial managers, which necessitates studies in this regard. The success of small businesses and middle managers depends heavily on techniques and decision-making processes. While the data is the basis of decision-making, many business managers lack systematic information skills, and information professionals do not know their real business information needs.

Due to the increasingly unstable and ever-changing business environment, business information has become a strategic weapon used by managers. With the increase in complexity and dynamicity of the business environment, business information becomes increasingly important for managers to constantly monitor external circumstances and identify strategic threats and opportunities (Milliken, 1990). On the one hand, senior managers can actively adapt their organization to environmental changes using business information to ensure its survival and prosperity. Some information professionals believe that there is a direct link between information and performance improvement (Jorosi, 2006). On the other hand, the transformation of the fast-moving world of science and technology and the consecutive challenges of the socio-economic system, reduction of natural resources, and the increase in poverty and unemployment mean that policy-makers now take this into account about small and medium-sized enterprises (SMEs).

SMEs in any country play a significant role in economic development.

SMEs comprise a large portion of national economies (Hill, 2001). Since important innovations and technological advances often do not happen in large industries or organizations because following market trends and current needs is more difficult due to the complex nature of large enterprises. In comparison, SMEs offer various advantages to the entire economy in the country, including fast implementation speed, high employment potential, and reduction of the final price. The success of SMEs depends significantly on the techniques and decision-making processes of their managers (Gibbs and van Hassel, 2008). In such circumstances, uncertainties lead to risky and problematic decisions. While the risk of decision-making in SMEs is higher than in others, a wrong decision can easily lead to bankruptcy and closure.

What is the basis of decision-making in SMEs? Information is the basis of decision-making and information flow, like blood flow, plays a vital role in maintaining the life and health of a business enterprise. High-quality information can lead to the collection and evaluation of two types of 1) environmental data, and 2) business-related data, both of which affect the decision-making process. In the meantime, the lack of interest in business information can be due to two

factors. Many business executives lack systematic information skills, so they do not have the confidence to ask for adequate information. Most managers do not know how to manage their available information. Information professionals lack sufficient knowledge regarding the real information needs of customers, including industrial managers (Shokane, 2003).

Understanding the priorities of managers in SMEs using these two types of information sources (i.e., formal and informal), followed by providing access and exposing their preferred sources of information, can save the budget, and the SMEs invest effectively and efficiently. Moreover, understanding managers' information needs and information-seeking behavior is a critical precondition for designing relevant and effective information systems for these users (Jurosi, 2006). In the field of information science and knowledge, at many prestigious universities around the world, the business information sources course is taught to students as one of the courses, while in Iran, the role of librarians and information professionals in this field is very dim and even forgotten, and further studies are needed on the current state of using information sources in business, especially in the small and medium enterprises.

The concept of information source is generally any source of information (including documents, conditions, and locations) that offers accessible information. Formal information sources (such as data, documents, and texts) surround an agent without direct social contact with information users (Widén and Holmberg, 2012). While informal sources lack order, predetermined structure, and tracking capabilities, they might contain useful information. These informal sources include negotiations, phone calls, messages, and information boards (AngelFire, 2021). Informal information sources have direct social contact with information users.

Business information refers to all documented information created or retrieved during any business operation; internal sources are created inside an enterprise and through processing data created in the enterprise's operations, while external sources are gathered from outside of the enterprise and used to improve the decision-making capabilities of managers. It is worth noting that globally SMEs are subdivided into micro-enterprises (fewer than 10 employees), small enterprises (10 to 49 employees), and medium-sized enterprises (50 to 249 employees). Large enterprises employ 250 or more people (OECD, 2021).

The purpose of this survey was to determine the priorities of formal and informal sources of information for decision-making among managers of SMEs in the Jey Industrial Zone (Shahrak-e Sanati-e Jey) in Isfahan, Iran.

Research Questions

RQ1: What types of information are used by managers in SMEs for decision-making?

RQ2: What is the amount of usage of internal and external formal information sources in decision-making by managers in SMEs? Is there any difference between the amount of usage of internal and external sources?

RQ3: What is the extent of usage of informal information sources in decision-making by managers in SMEs?

RQ4: Is there any difference between the use of formal and informal information sources in decision-making by managers in SMEs?

RQ5: Is there any difference in the use of information sources (formal and informal) in different industries (micro, small, and medium-sized), management levels (senior, medium, and executive managers), and management positions?

RQ6: What factors affect the selection of information sources by managers in SMEs?

Materials and Methods

This survey was done to determine the priorities of formal and informal sources of information for decision-making among managers of SMEs in the Jey Industrial Zone (Shahrak-e Sanati-e Jey) in Isfahan, Iran. The Isfahan province was selected as the study location due to its position as one of Iran's main industrial hubs in the last 200 years. Different enterprises positioned in different industrial zones have similar positions, and to make the population more homogeneous, one industrial zone was selected as the study location. Among different industrial zones, Jey Industrial Zone is the largest industrial complex in Isfahan with the most variety of products to be studied, and a list of productive industrial enterprises categorized by-products was selected 1. Electrical and electronics, 2. Cellulose, 3. Chemical productions, 4. Food, 5. Metallurgy, 6. Non-metal (mineral) processing, and 7. Textile. Table 1 shows the frequency distribution of sample SMEs by products. The study used Krejcie and Morgan's (1970) table to determine a sample size from each category of SMEs, with a confidence level of 95% and a z-score of 1.96.

A total of 266 industrial enterprises were registered in Jey Industrial Zone, among which 183 were active, making up the study population. Among these numbers, 124 industries were selected as the study sample, as shown in Table 1. Then, their managers were asked to answer the study questionnaire.

Table 1. Frequency distribution of the sample SMEs by products

SMEs by products	Sample	Percentage
Metallurgy	31	25
Electrical and electronics	26	21
Food	24	19.4
Chemical productions	15	12.1
Textile	11	8.9
Non-metal (mineral) processing	9	7.3
Cellulose	8	6.5
	124	100

The data collection tool was a researcher-made questionnaire based on the literature review. This questionnaire included 67 items using the 5-point Likert-scale. The questionnaire included

demographic information and five dimensions measuring the use of different types of information, time spent for information retrieval, the use of formal and informal information channels, and criteria used for selecting information sources. Finally, an open question at the end of the questionnaire asked for any information sources which are effective in decision-making but are not mentioned in the questionnaire. The questionnaire's validity was confirmed using the content validity approach and after confirmation by the supervisor, the advisor, two faculty members in library and information science, and two information professionals.

The reliability of the questionnaire was determined using the Cronbach's alpha internal consistency coefficient, with a result of 0.93, which was calculated using the SPSS software. This means that the questionnaire has suitable reliability based on Nonali and Bernstein's (1978) definition. Data analysis was performed using the SPSS software. Finally, it should be noted that all data in the current study had normal distribution in all the cases; parametric tests were used in data analysis.

Results

Data analysis was carried out to answer the following questions.

Types of Information Used by Managers in SMEs for Decision-Making

Customer information, technical information, and competition information are the types of information mostly used in decision-making by managers in SMEs. In contrast, geographical information and cultural and social information are the types of information used the least in decision-making by managers in these enterprises (Table 2).

Table 2. Frequency distribution of information types

Row	Type of information	Very low	Low	Average	Much	Very much	Average
1	Customer information	3	8	20	35	58	4.01
2	Technical information	4	4	18	53	45	4.05
3	Competitors information	3	9	24	33	55	4.03
4	Economic information	4	15	31	41	33	3.67
5	Legal information	6	19	41	33	25	3.41
6	Geographical information	17	24	44	78	11	2.93
7	Cultural and social information	12	30	47	26	9	2.91

Usage of Internal and External Formal Information Sources in Decision-Making by Managers

When considering internal formal information sources, managers in SMEs in the city of Isfahan mostly used four sources, including i) archives of previous documents and information, ii) annual reports of industrial enterprises, iii) mission, vision, goals, and roadmaps of the enterprise, and iv) customer information database. Other internal formal information sources consist of 1. reports by research institutes and labs, 2. internal memos and announcements of industrial enterprises, and 3. characteristics and details of industrial enterprises, have the least use (Table 3).

Table 3. Frequency distribution of internal sources used by industrial managers

Row	Type of information	Very low	Low	Average	Much	Very much	Average
1	Past record archives and information	3	11	31	49	30	3.7419
2	Industry annual reports	10	11	31	44	28	3.5565
3	Mission, vision and goals	8	19	31	40	26	3.4597
4	Customer database	14	20	28	41	21	3.2823
5	General analytical reports	14	17	37	36	20	3.2500
6	Agency analytical reports	20	16	30	37	21	3.1855
7	Specifications and semi-cleavage of the industrial enterprise	13	22	41	36	12	3.0968
8	Internal announcements and newsletters	26	26	35	27	10	2.7500
9	Reports of research institutes and laboratories	27	30	28	28	11	2.7258

Regarding external formal information sources, managers in SMEs in the city of Isfahan mostly used five sources, including “search engines such as Google and Yahoo!,” “websites and weblogs,” “professional books,” “multimedia sources (pictures, videos, and sounds),” and “television programs.” Five other external formal information sources consist of “patents,” “bibliography and book indexes,” “dissertations and research proposals,” “radio,” and “public statistics in Iran and other countries,” which are used the least by managers in these enterprises (Table 4).

Table 4. Frequency distribution of external sources used by industrial managers

Row	Type of information	Very low	Low	Average	Much	Very much	Average
1	Internet search tools	5	7	19	46	47	3.9919
2	Websites, blogs, and ...	7	7	28	43	39	3.8065
3	Specialized books	10	18	38	38	20	3.3226
4	Audio Visual Resources	6	19	44	45	10	3.2742
5	Television	13	24	37	29	21	3.1694
6	Brochures and leaflets	11	19	48	39	7	3.0968
7	Automatic notifications	20	21	31	34	18	3.0726
8	Maps, charts, and tables	15	24	36	26	13	3.0645
9	Laws and Regulations	23	17	36	31	17	3.0161
10	Reviews	26	23	41	28	6	2.7177
11	Newspapers	25	32	38	18	11	2.6613
12	Public journals	29	33	35	20	7	2.5403
13	Professional and academic publications	29	34	38	19	4	2.4758
14	Guides and manuscripts	31	36	31	25	1	2.4274
15	Industrial Statistics	34	32	33	23	2	2.4113
16	Encyclopedias	44	30	32	14	4	2.2258
17	General Statistics	37	42	30	13	2	2.2016
18	Radio	44	35	31	9	6	2.1694
19	Theses and Research Projects	45	36	29	10	4	2.1290
20	Bibliographies and Catalogs	43	43	30	7	1	2.0323
21	Patent licenses	64	29	22	8	1	1.8145

Regarding the possible differences between the use of internal and external formal information sources by managers, the data related to the use of internal formal information sources

(Sig=0.543) and the use of external formal information sources (Sig=0.781) have a normal distribution. Therefore, a parametric dependent t-test was used to determine the differences between these two parameters. The results indicated a significant difference between internal and external formal information sources by managers in SMEs, with internal information sources being used more by the managers. Therefore, we can conclude that managers of SMEs in Isfahan prefer internal formal information sources rather than external sources. Thus, there is a difference between the amount of usage of internal and external sources.

Usage of Informal Information Sources in Decision-Making by Managers in SMEs

Managers in SMEs in Isfahan mostly use informal information sources, including “personal knowledge and information (based on personal experience),” “expert opinions,” “colleagues,” “daily work relations (personal relations),” and “training programs.” In contrast, other informal information sources consisting of the “general public,” “librarians, information and informatics professionals,” “friends (other than colleagues),” “assistants or interns,” and “speeches and conferences” are used the least (Table 5).

Table 5. Frequent distribution of managers’ use of informal sources of information

Row	Unofficial information source	Very low	Low	Average	Much	Very much	Average
1	Knowledge and personal information (experiences)	3	9	22	48	42	3.9435
2	Experts	6	9	34	52	23	3.6210
3	Partners	3	13	37	47	24	3.6129
4	Everyday Work (Personal Communication)	10	19	31	46	18	3.3468
5	Training courses	12	16	34	50	12	3.2742
6	Employees of similar industrial enterprises	16	15	42	40	11	3.1210
7	Conferences and Exhibitions	16	24	42	29	13	2.9919
8	Social Networks	23	19	36	33	13	2.9516
9	Membership in professional associations and guilds	19	22	44	26	13	2.9355
10	Lectures and meetings	21	30	39	26	8	2.7581
11	Assistants or trainees	23	34	34	27	6	2.6694
12	Friends (except colleagues)	32	29	36	23	4	2.5000
13	Librarians, information professionals and information specialists	34	32	34	15	9	2.4597
14	Ordinary people	54	36	25	7	2	1.9274

Differences between the Use of Formal and Informal Information Sources in Decision-Making by Managers in SMEs

In question 4, the use of formal information sources includes the amount of use of all internal and external formal information sources. Data related to the use of formal (sig=0.892) and informal (sig=0.342) information sources both have a normal distribution. Therefore, a parametric dependent t-test was used to determine the difference between these two parameters. The results indicated a significant difference between the use of formal and informal information sources,

with informal information sources being used more on average. As a result, it can be concluded that informal information sources are used more than formal information sources in decision-making by managers in SMEs in Isfahan.

Differences in the Use of Information Sources, Management Levels, and Management Positions

To answer research question five, we asked three questions as follows:

1. *Is there any difference in the use of information sources (formal and informal) and three management levels (senior, middle, and executive managers)?*

Since all three management levels are independent and the data study shows the normal distribution, a parametric ANOVA test was used to determine the difference in the use of information sources (Table 6).

Table 6. The ANOVA test for the usage of formal and informal information sources by organizational levels

Variable		Squares sum	Degrees of freedom	Mean squares	Degrees of freedom	Criterion of decision
Formal Information sources	Inter groups	0.708	2	0.354	1.175	0.312
	Inside the group	36.432	121	0.301		
	Total	37.139	123			
Informal Information sources	Inter groups	0.963	2	0.481	1.425	0.244
	Inside the group	40.856	121	0.338		
	Total	41.818	123			

The results indicate that the use of neither formal nor informal information sources changes significantly at different management levels.

2. *Is there any difference in the use of information sources (formal and informal) in different industries (micro, small and medium-sized)?*

The ANOVA test was used to determine the difference in the use of information sources in different industries (Table 7).

Table 7. The ANOVA test for the usage of formal and informal information sources by the micro, small, and medium-sized industries

Variable		Squares sum	Degrees of freedom	Mean squares	Degrees of freedom	Criterion of decision
Formal information sources	Inter groups	1.418	2	0.709	2.402	0.095
	Inside the group	35.721	121	0.295		
	Total	37.139	123			
Informal information sources	Inter groups	4.472	2	2.236	7.244	0.001
	Inside the group	37.347	121	0.309		
	Total	41.818	123			

The results indicate that the use of formal information sources shows no significant difference in different industries. However, there is a significant difference in the use of informal information sources in different industries. As a result, a Chi-square test was used to determine this difference (due to the convergence of parameters). The results indicate that managers in

middle-sized enterprises use informal information sources more than managers in micro and small enterprises (Table 8).

Table 8. The Chi-squared test results for the use of informal information sources

First level	Second level	Averages differences	Significance level
Average	Micro	0.58599*	0.001
	Small	0.25939*	0.043

3. *Is there any difference in the use of information sources (formal and informal) for different management positions?*

With the fact that seven management positions are independent and due to the normal distribution of gathered data, the parametric ANOVA test was used to determine the differences in the use of information sources by different management positions. The results indicated no significant differences in the use of formal or informal information sources by different management positions (Table 9).

Table 9. The ANOVA test results for the use of formal and informal information sources in management positions

Variable		Squares sum	Degrees of freedom	Mean squares	Degrees of freedom	Criterion of decision
Formal information sources	Inter groups	0.799	6	0.133	0.445	0.846
	Inside the group	23.628	79	0.299		
	Total	24.428	85			
Informal information sources	Inter groups	1.899	6	0.317	0.915	0.489
	Inside the group	27.334	79	0.346		
	Total	29.233	85			

Factors Affecting the Selection of Information Sources by Managers in SMEs

Data indicates that “precision and accuracy of information” is the most important factor in selecting the information sources by managers in SMEs in Isfahan. Other less important factors include “credibility,” “up-to-date information,” “ease of use,” and “accessibility” are other less-important factors. The results indicate that the “cost of information” is the least influential factor in sectioning the information sources (Table 10).

Table 10. Frequency distribution of factors influencing the selection of information sources by managers

Row	Information source feature	Frequently distribution	Very low	Low	Average	Much	Very much	Average
1	The accuracy of the information	Frequency	0	5	6	34	79	4.5081
2	Validation of the source	Frequency	0	4	12	41	67	4.3790
3	Up-to-date information	Frequency	0	6	21	49	48	4.1210
4	Ease of use	Frequency	2	6	18	52	46	4.0806
5	Resource Availability	Frequency	2	5	23	49	45	4.0484
6	Integrity and consistency of information	Frequency	0	11	26	54	33	3.8790
7	Proper cost	Frequency	5	13	35	35	36	3.6774

Discussion

In this section, we discuss the research questions with answers.

Q1: The findings showed that “technical information,” “competition information,” and “customer information” are the types of information mostly used in decision-making by managers in SMEs. In contrast, “geographical information” and “cultural and social information” are the types with the least amount of use. Kinnell, Feather, and Matthews (1994) showed that managers often seek information related to product development, production, and marketing. Another study by Jorosi (2006) on the information needs of managers in SMEs in Betsawa showed that managers consider customer and competition information as the most important forms of information. Therefore, the results of the current study are in agreement with those reported by Kinnell et al. (1994) and Jorosi (2006). Chiware and Dick (2008) reported the following ranking for information needs of small, medium, and large industries: budget, market, production, training, policy development, raw materials, regulations, technical information, and other types of information. Their results show a different ranking for financial and technical information than the results presented in the current study. Another study by Maroufi (2009) showed that decisions followed competitive trends, which were based on financial trends. These results are also in accordance with the results of the current study.

On the one hand, managers must prioritize technical information for effective decision-making due to the fast technological and scientific changes. On the other hand, financial problems, lack of economic activity, and a competitive environment hinder the sale of products, increasing the need for customer and competition information. This means that financial information takes priority due to constant changes in the economy, especially in currency exchange rates (the case of Iran), and the fact that SMEs are created in the private sector. Managers in these enterprises rarely bother with legal information and only seek basic information related to work and salary laws, regulations, human resources laws, import, and export regulations, while outsourcing more serious matters to their lawyers. Furthermore, production depends on how the climate creates some changes in technical factors and the acquisition of raw materials. As a result, the use of geographical and environmental information was investigated in the current study. However, it appears that these types of information are not the priority of the managers.

Q2: This question investigated the use of formal information sources by the managers of SMEs and the difference between the use of internal and external sources. Formal information sources for any industrial enterprise can be divided into internal and external sources. The preference of internal information sources in the current study included 1. Archives of previous documents and information, 2. Annual reports of industrial enterprises, 3. mission, vision, goals, and roadmaps of industrial enterprises, 4. Customer databases, 5. General analytical reports of industrial enterprises, 6. Analytical reports of local representatives, 7. Characteristics and profile

of industrial enterprise, 8. Memos, and internal newsletters of industrial enterprises, and 9. Reports by labs and research centers. According to the observed results, some of the investigated SMEs lacked sufficient size for internal newsletters, which resulted in this option having the lowest priority.

Furthermore, industrial SMEs usually use labs and research centers only when needed, although some SMEs have internal quality control (Q.C.) labs. Many managers did not properly understand the concept of “industrial profile” mentioned in the questionnaire. Furthermore, many managers believed that they could not create long-term or even short-term goals due to the instability of the market and economy in the country (i.e., Iran) and rapid changes in policies. However, the “mission, vision, goals, and roadmaps of an industrial SME” had a high priority and ranked third among information sources.

According to the results, the preferences for external formal information sources were 1. Search tools such as Google and Yahoo!, 2. Websites, weblogs, and similar sources, 3. Professional books, 4. Multimedia (video, picture, sound) sources, 5. Television programs, 6. Brochures and pamphlets, 7. Automated newsletters such as e-mails or RSS, 8. Maps, charts, and tables, 9. Laws, regulations, and guidelines, 10. Criticisms and reports, 11. Newspapers, 12. Public magazines, 13. Professional and academic publications, 14. Guides and letters, 15. Industrial statistics in Iran and other countries, 16. Encyclopedia and journals, 17. General statistics in Iran and other countries, 18. Radio programs, 19. Dissertations and research proposals, 20. Bibliography and book indexes, and 21. Patents.

This preference analysis shows that professional and academic publications, dissertations and research proposals, and patents are placed at low priorities. In industries, which can only survive by moving toward knowledge-based production, analysis and application of new scientific and technical information are essential. It seems that managers’ lack of attention to these scientific and technical information sources is due to weak industry-university-research links and low levels of industry-university collaboration. Thus, the gap left by librarians and information professionals who have a professional outlook on information and knowledge management can be seen. The results also indicated that internal information sources are used more than external ones.

The key conclusion in the study by Olaisen (1991) was that attention toward internal information is higher in financial institutions than external information. Another study by Lin, Cole, and Dalkir (2014) investigated the values of information sources for 17 Chinese businessmen during strategic management decision-making. Their findings showed that participants preferred internal–personal information sources to external–impersonal sources of information. These results are in agreement with the results of the current study

Q3: This question investigated the use of informal information sources in managers' decision-making in SMEs. According to the results, priorities for informal information sources were 1. Personal knowledge and information (based on personal experience), 2. Expert opinions, 3. Colleagues, 4. Daily work relations (personal connections), 5. Training programs, 6. Employees of similar industrial SMEs, 7. Exhibitions and conferences, 8. Social networks, 9. Membership in professional associations and unions, 10. Speeches and gatherings, 11. Assistants or interns, 12. Friends (other than colleagues), 13. Librarians, information and informatics professionals, and 14. Ordinary people.

Marshall, West, and Aitken (2011) state that "people" are the most accessible and useful information sources in clinical environments. In contrast, text and electronic sources are the least accessible sources of information (mostly due to the time required for accessing the information available in these sources). Huvila (2013) showed that financial managers' success in large companies is mostly based on their ability to mix formal and informal information with their previous experiences instead of access to certain pieces of information. According to Frankl (2010), most managers' decisions in SMEs are subjective, intuitive, and based on their previous experiences.

In the current study, personal experience has the highest priority among informal information sources, which agrees with Frankl's opinion, stating that the majority of decisions are intuitive and based on experiences gathered over the years. Expert opinions have the second ranking among informal sources, which indicates the important role of experts in decision-making. However, librarians and ordinary people are in the last spots with the lowest priority.

Q4: This question attempted to determine the difference between the use of formal and informal information sources among managers of SMEs. In this question, formal sources included all internal and external formal sources of information. Given the normal distribution of data, a parametric dependent t-test was used to this end. The results indicated a significant difference in the use of formal and informal information sources, with informal information sources being used more often. This means that managers of SMEs in Isfahan mostly used informal information sources.

Frishammar (2003) states that personal information sources are necessary to interpret the unknown problems. Researchers and information seekers prefer to gather information from trusted individuals. In an investigation on the small and medium-sized financial institutes in China, Dhua (1990) concluded that managers mostly use personal information sources and that formal information sources are rarely used. Chalmers (1995) also investigated managers' information needs in New Zealand and showed that the environmental survey often includes the use of primary sources of information. In most cases, published sources of information are used

as complementary or in addition to personal information sources. Shokane (2001), in an investigation on SMEs in South Africa, stated that business managers still mostly use informal information sources for their decision-making.

The results of the current study agree with all the previous results and again indicate the popularity of informal sources of information. However, these results do not determine other factors. According to Barrutia et al. (2014), the effect of informal sources of information is nonlinear (although different in each area), while the effects of formal information sources (which require more time, effort and have higher costs) show a diminished return and lead to information saturation at higher usage of formal sources. The study by TajMouhamadAliNejad (2013) attempted to investigate the relationship between managers in the healthcare system and their sources of information during decision-making. The results indicated that most information used for decision-making includes internal expert opinions, formal information, previous knowledge, guidelines, opinions of senior managers, opinions of external experts, evidence-based information, and budget information.

Q5: This question attempted to determine the use of different information sources (formal and informal) among managers in different enterprises (micro, small and medium-sized), different management levels (senior, middle, and executive management), and different management positions. This question was investigated in different parts.

1. Difference between the use of formal and informal information sources among different management levels (senior, middle, and executive managers)

Since all three management levels are independent and research variables show a normal distribution, a parametric ANOVA test was used to determine the difference in the use of information sources. The results indicate no significant differences in the use of formal and informal information sources at different management levels.

2. Difference between the use of formal and informal information sources in different enterprises (micro, small and medium-sized).

The ANOVA test was used to determine the difference in the use of information sources in different industries. The results indicate that the use of formal information sources shows no significant difference in different industries. However, there is a significant difference in the use of informal information sources in different industries. As a result, a Chi-square test was used to determine this difference (due to the convergence of parameters). The results indicate that managers in middle-sized enterprises make more use of informal information sources compared to managers in micro and small enterprises. In this regard, Orminski (1991) believes that enterprises with more developed business strategies attempt a more systematic and formal information-gathering approach. Vaughan, Tague-Sutcliffe, and Tripp (1996) found that small

enterprises usually gain information through informal sources, including customers, agents, friends, colleagues, and family members. The findings of the current study are different from these two previous findings. Since medium-sized enterprises have a more developed bureaucratic system, there are many brainstorming and discussion sessions compared to micro and small enterprises. These medium-sized enterprises also commit to membership and participation in associations and unions and have a better financial incentive for participation in exhibitions and conferences. As a result, they can have access to more informal sources of information.

3. Difference between the use of formal and informal sources of information by different management positions

According to the seven management positions, they are independent. Due to the normal distribution of the research variables, the parametric ANOVA test was used to determine the difference in the use of information sources by different management positions. The results indicated no significant difference in the use of formal or informal information sources by different management positions.

A study by Lin et al. (2014) showed that there are significant differences in the valuation of each source of information: communication managers gave a significantly lower priority to information sources such as customers, newspapers, magazines, conferences, and work trips compared to productions managers but believed libraries, the Internet, and databases to have a higher priority. The industrial sector could significantly affect the sources of information used in decision-making. Therefore, the results of the current study are different from the results reported by Lin et al.

Q6: This question attempted to determine factors influencing the selection of information sources for decision-making by managers in SMEs. According to the results, these factors, in order of importance, are 1. Precision and accuracy of the information, 2. The credibility of the source (trustworthiness), 3. Up-to-date information, 4. Ease of use, 5. Accessibility of the source, 6. Comprehensiveness and continuity of the information, and 7. Cost of the information.

Chalmers (1995), based on a study in New Zealand, stated that a business's competitive ability in a global market depends on the availability of comprehensive and easily accessible information resources. Therefore, she believed that comprehensiveness and ease of use have the highest priorities. In another study by Jorosi (2006), the majority of participants had selected their information sources based on ease of use and accessibility with continuity and credibility having the next priorities. These results are somewhat similar to the results of the current study.

Conclusions and Research Suggestions

From the results, it can be concluded that managers in SMEs in Isfahan prefer internal formal information sources rather than external sources. Thus, there is a difference between the amount of usage of internal and external sources. In addition, it is found that informal information sources are used more than formal information sources in decision-making by managers in SMEs in Isfahan. Moreover, managers in middle-sized enterprises make more use of informal information sources compared to managers in micro and small enterprises.

Research studies are carried out to answer specific questions and address unique concerns, offering practical suggestions and solutions based on the results. In the current study, the following suggestions are offered based on the results:

- Since the results showed that the use of internal information sources was higher than external information sources, managers should be encouraged to make use of knowledge management and document management systems.
- As the results reveal that informal sources of information were more commonly used, the deputy of SMEs can help by holding more exhibitions and conferences and creating unions and associations in different industrial fields to reduce the cost of participation for small enterprises with limited capital. It is also possible to help managers of SMEs attend international exhibitions and conferences in other countries.
- It is suggested that relevant authorities create training opportunities and facilities for knowledge management to move toward a knowledge-based economy.
- The use of search tools and websites currently has the highest priority among external formal information sources. Therefore, the development of Internet access and online services and platforms for SMEs can help these industries improve their business opportunities.
- Given the determined priority of information sources in this study, facilitating access to sources with higher priorities can reduce the cost and effort required for information gathering.
- Given the essential nature of SMEs for the national business environment, the government initiatives should go beyond simple help for establishing these enterprises. They should also facilitate access to information for these enterprises and provide training and workshops on information gathering and knowledge management skills.
- The current study showed that librarians and information professionals have a low priority as managers' information sources. This is due to the limited involvement of librarians and information professionals in the industrial sectors. Due to the low familiarity of librarians

and information professionals with business information, one suggestion is to add “business information” courses to the curriculum of library and information science in universities.

- Information professionals should create a list for small and medium-sized industries and offer them the selected information to improve their management and decision-making capabilities.
- Given that the results indicated a low priority for important sources of information such as professional journals and publications, another suggestion is to create *business libraries* or *business information centers* in industrial towns. These business libraries, managed by information professionals, can assist the managers of SMEs in their information gathering prior to making a decision, improve their information-seeking skills, and remind them of the importance of information to run a successful business.
- Since television (especially the [IRIB Iran Kala](#) TV channel, i.e., Iran goods channel) is the preferred mass media used by managers, we suggest creating TV programs dedicated to improve the information literacy of business managers and meet their business information needs.

Author Contributions

Conceptualization, P.K. and A.N.; methodology, P.K. and A.N.; software, P.K.; validation, P.K. and A.N.; formal analysis, P.K.; investigation, P.K.; resources, P.K. and M.N.; data curation, P.K.; writing—original draft preparation, P.K.; writing—review and editing, A.N. and M.N.; visualization, P.K.; supervision, A.N.; project administration, A.N. All authors have read and agreed to the published version of the manuscript.

Data Availability Statement

Data available on request due to privacy and ethical restrictions.

Acknowledgements

The authors would like to thank all managers of SMEs in the Jey Industrial Zone on Isfahan in Iran, for their participation in the present study and for generous assistance.

Ethical considerations

Not applicable.

Funding

Not applicable.

Conflict of interest

The authors declare no conflict of interest.

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