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Review

Human Factor in Food Label Design to Support Consumer Healthcare and Safety: A Systematic Literature Review

Angelo Corallo [1], Maria Elena Latino [1,*], Marta Menegoli [1], Biagia De Devitiis [2] and Rosaria Viscecchia [2]

[1] Innovation Engineering Department, University of Salento, 73100 Lecce, Italy
[2] Department of the Sciences of Agriculture, Food and Environment University of Foggia, 71121 Foggia, Italy
* Correspondence: mariaelena.latino@unisalento.it; Tel.: +39-0832-297949

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Abstract: Labels play a strategic role in communication, representing the interface between consumers and the food system. Consumers' ability to correctly understand product label information was essential for health and safety, making a sustainable choice, as also demonstrated by the Federal Regulations of USA, which define several guidelines to increase the readability of labels. Human Factor studies the interface design in order to assure users' safety, comfort, and productiveness. So, it could be applied in label design to enhance consumers' safeguard and healthcare. The aim of this study is to analyze the fields of application of the Human Factor in label design to evaluate the current methods of utilization in the food industry. A two-step literature review was applied, using bibliometric and content analysis. From bibliometric analysis, 6 clusters of themes and the predominance of medical terms arose. The absence of terms related to the food domain is surprising. So, a content analysis on lead papers' sample related to the Food Industry was carried out to identify evidence about the human factor in food label design. From content analysis, 2 groups of works' results, focused on the possibility to consider the human factor in: i) pharmaceutical label design, ii) food label design, respectively. The studies in food label design primarily focused on label readability related to content positioning and not on its understandability. The practical implications of the study include the construction of a new concept of label in terms of contents and communication channels.

Keywords: human factor; food label design; consumer health; consumer safety; systematic literature review; bibliometric analysis

1. Introduction

Consumers' ability to correctly understand information shown on product labels can be essential for health and safety [1] or to simply make an informed choice regarding sustainability, respective of personal principles and values [2–4]. Indeed, informed decision-making depends on people's ability "to accurately evaluate and understand information about risk" related to a product or a situation [5].

Although this statement can be valid for many types of products, in some fields, such as food and drugs, it assumes a stronger value, leading to the necessity of building safety into labels design [6].

In recent decades, the consumers' need to have detailed information about food ingredients has grown, because of allergies, dietary restrictions, or drug interactions [7]. As many as 98,000 people die each year due to preventable medical errors such as the selection of the wrong drug [8,9]. This evidence highlights that human error reduction in healthcare is still an urgent priority [10,11].

For this purpose, a good drug label design could be based on expertise and sound human-centred design principles [12]. Three aims can be attributed to labelling of food products [13]: (1) information

for consumers, (2) protection of the consumers, (3) fairness in trade. These aims are interrelated: "correct information on the identity, nature and composition of the food should prevent the consumer to make choices which are inappropriate healthy diet and should guarantee equal opportunities for the marketing of comparable foods" [13].

According to this logic, the United States of America (USA) code of Federal Regulations proposes the same legislation for food and drug products, which seeks to increase the readability of labels in order to reach development, by consensus among consumers, manufacturers, and health professionals, of new label formats which are more understandable than earlier formats [14,15]. Indeed, Food and Drug products are similar in consumption mode and in their effects on consumer healthcare.

On the other hand, there is a growing interest about sustainability issues among consumers [16] (economic, environmental and social), which has potential implications for the label claims [17].

Moreover, in the light of numerous hazards which affected agri-food industry [18] and mislabelling practices [19,20], consumers' preference for stricter monitoring and control of food products and fraudulent production practices have increased [21], to ensure the safety and healthcare of people.

For that reason, consumers embrace movements such as Food Democracy [22] or Food Citizenship [23], considered by [24] as keys to the transformation of agri-food systems in the long run, taking into account moral, ethical, health, or sustainability issues in the consumption choices process, with repercussions also on the label claims. Based on these preliminary remarks, we find that the label plays a strategic role in the communication process, because it represents the interface between consumers and the food system product [25], creating a communication channel in the absence of a face-to-face relationship [26].

In this regard, the recent literature shows that the product and service delivery process could be improved by the use of the Human Factor [27].

The Human Factor is a process referring to the design of machines, systems, work methods, and environments to consider the safety, comfort, and productiveness of human users and operators [28]. Human Factor design is widely applied in computer graphics interaction [29–33] as well as human and robot interaction [34–37] to take into account "in a broad sense to include, unsafe acts (including human error and violations),and also other factors, such as individual, organizational, technological, and environmental factors, that might be considered to have an effect on human or system performance" [9]. Labels on food products represent the interface between the food company and consumer. It is used to communicate the product information, leading the consumer to make a healthy and safe food choice. So, proper labelling and inclusion of detailed information about the product could be considered in the label design to improve consumers' understanding about healthiness and sustainability, particularly in the food sector. Indeed, for food products, the length of the supply chain and the type of distribution make the label the main communication tool between user and producer.

So, the following research questions arise:

Is "human factor" applied to "label" design in the current scientific scenario?
What are the fields in which these concepts have been most explored?
How do these concepts find application in the Food Industry? Are they used to assure consumers healthcare?

In order to give an answer to the abovementioned research questions, the literature review method was chosen. The first step considered a bibliometric analysis, which was used to identify the fields of Human Factor application, followed by a systematic content analysis to identify how this concept could be applied in the food industry.

2. Materials and Methods

In order to provide answers to the aforementioned research questions, a literature review method was chosen, highlighting the boundaries of knowledge [38]. A systematic literature review gains

recognition as a valid and important approach to "construct evidence from evidence" [39] and, as proposed by [40], it needs an iterative process that encompasses the definition of appropriate search keywords, the literature search and its analysis, so, following a structured methodology is recommended [41]. Considering this approach and following PRISMA guidelines [42], a 3-step methodology for data collection and analysis was used to identify how Human Factor is applied to label design (Figure 1). The steps are as follows:

- defining search scheme and sample definition;
- initial statistical analysis on sample;
- data analysis.

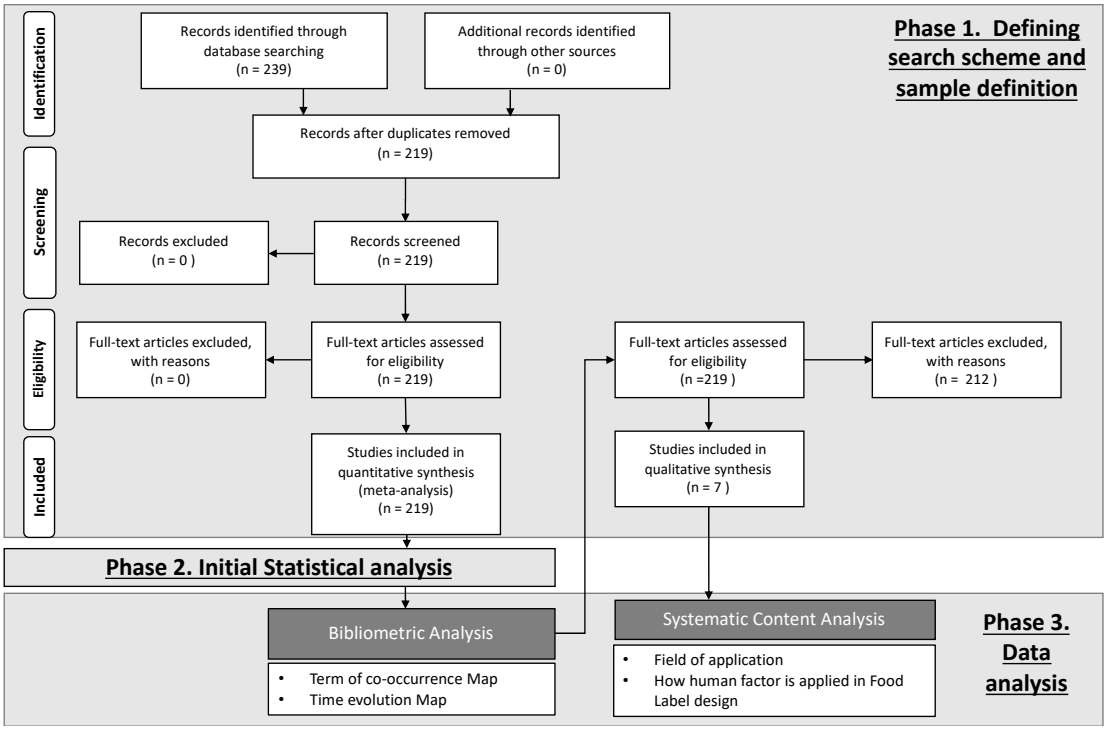

Figure 1. Methodology for data collection and analysis according to PRISMA guidelines.

Particularly, the used literature review process was iterative. Indeed, from phase 3 after bibliometric analysis, results lead us to focusing the analysis on a subsample of paper, returning to phase 1 and applying the selection criterion in Table 1.

Table 1. Selection criteria.

	Selection Criterion	Motivation
First	The paper must contain the word "food."	Because the objective of the study is focused on the Food Industry.
Second	The paper must treat the issue related to label as a communication tool in any industry.	Because good approaches are already applied in other industries, could be transferred to the Food Industry for food label design.
Third	Availability of document in English language.	Because we had to be able to evaluate its contents.

2.1. Defining the Search Scheme and Initial Search Results

Keeping in mind the objective of this paper, keywords that fully cover the theme in exam were selected: "Human Factor" and "Label." Only a combination was used: "Human Factor" AND "Label."

The scope is to identify all works coming from literature that treat the two items at the same time, showing or not, any links between them.

The terms were searched into in the following indexed electronic scientific databases:

- Web of Science, published by Thomson Reuters, is considered the most important source of scientific data [43]; and
- Scopus, managed by Elsevier publishing, more comprehensive than the first one that encloses only ISI-indexed journal [44] and recommended as a good source [45].

The paper research in the database took place in October 2018. Particularly, the search in the Web of Science was conducted in "Title" and "Topic," choosing "all database," meanwhile the research in Scopus was conducted in "Article title, Abstract, Keywords" following the standard setting of database. In order to identify all works about Human Factor and Label, any temporal restriction was set.

An initial sample of 219 papers was identified, excluding duplicates (Web of Science data-base: 50; Scopus database: 189; Duplicates: 20).

The search results were exported in CSV and txt formats, storing all needed paper information: title, authors' names, authors' affiliations, abstract, keywords, and references.

2.2. Initial Data Statistics

Figure 2 shows the trend in quantity of papers published.

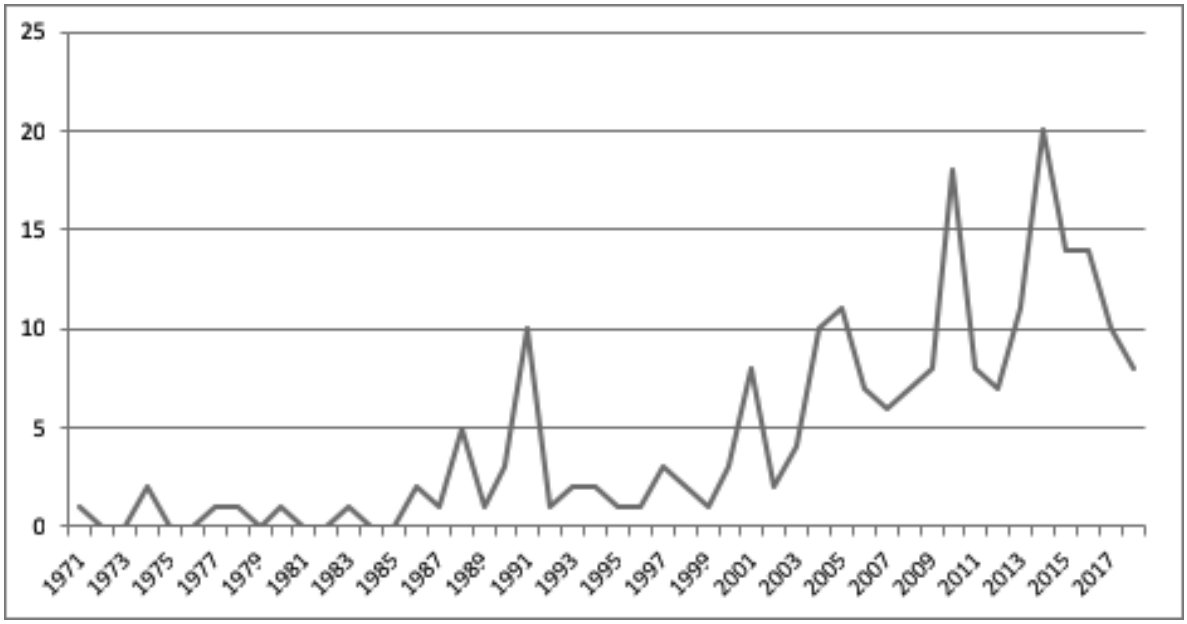

Figure 2. Publishing trend of the initial sample of 219 papers.

The first result that arose from analysis of the publishing trend is the consistent increase of publications on human factor and label from 2000 till now. This result confirms the major attention given by the scientific panorama to the association between human factor and label issues, probably as a result of the increase, in the same historical period, of general awareness about health, safety, and sustainability issues [46–48]. The first statistics on the initial sample of works show that 136 journals have contributed over time to the publication of 219 papers. It was found that 10 journals have published 83 of these identified articles, representing approximately 38% of all papers published. Figure 3 shows the journals in which these papers appeared.

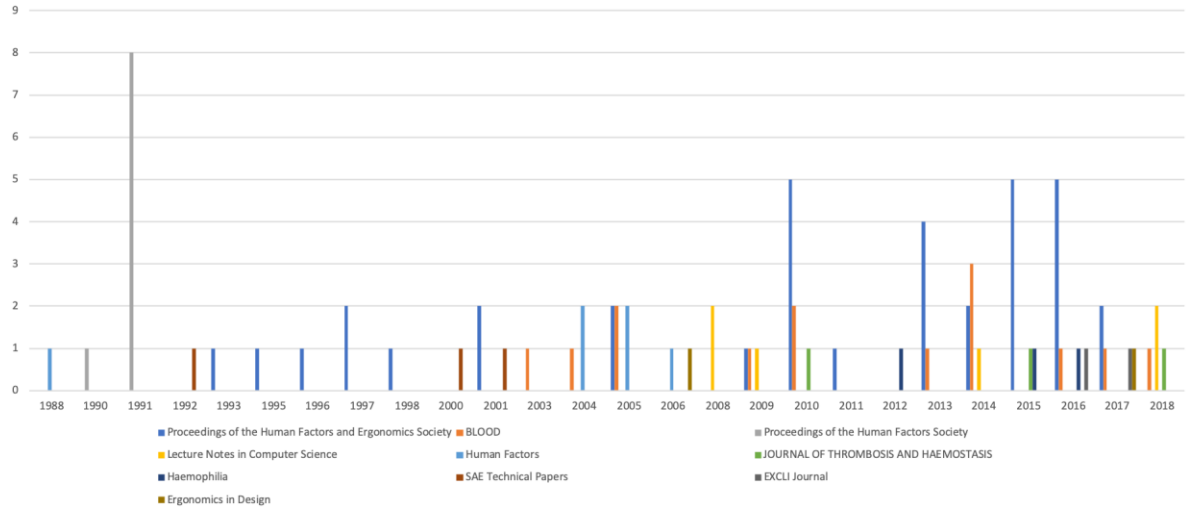

Figure 3. The top 10 publishing journals of initial sample of analysis.

Moreover, starting from the information available on indexed electronic scientific databases, the sample was analysed in order to identify the research areas of the works.

Thirty-nine categories of research area arose. Through an aggregation process that regrouped the research areas in the same branch of knowledge, 10 macro-categories were identified (for example: haematology, immunology, paediatrics, oncology, neuroscience, neurology were grouped in the Medicine macro-category). Each paper can treat themes related to more categories as shown in Table 2.

Table 2. Macro-categories of research areas.

Macro-Category	Counting
Medicine	131
Engineering	122
Social Science	50
Bio-Chemical	29
Pharmacology, Pharmacy	22
Environmental Science	16
Math and Physics	13
Psychology	10
Business and Economics	9
Health Care Science	9

Medicine and Engineering were the fields in which the relationship between "label" and "human factor" was more evaluated. Starting from the objective of the study focused on the food industry, it is interesting to underline that many categories related to the food system emerged, except for the category "Agricultural and Biological Science," encompassed into the "Environmental Science" macro-category.

2.3. Data Analysis

Data analysis is conducted in two consecutive parts including a "bibliometric analysis" and a "systematic content analysis." Bibliometric analysis is becoming a fundamental methodology for analysing research [49]. This kind of analysis has been widely used in the past (e.g., [50,51]) and has been used in many disciplines to better understand the nature of scientific activity [51–53] and it has also been applied to Human Factor studies [54].

So, in this work, bibliometric analysis was carried out in order to recognize the most recurrent themes in the Human Factor and Label fields, their relations, and the timing by which these themes are treated. For this scope, a network analysis and graphical investigation on text data was realized in order to create a term co-occurrence map using VOSviewer software [55–57]. Unlike most computer

programs that are used for bibliometric analysis and mapping, VOSviewer is more focused on the graphical representation of bibliometric maps, functionally useful for displaying large maps in an easy-to-interpret way [58].

Bibliometric analysis was chosen because, when performed at the macrolevel, it is able to supply a general assessment of a research field as a whole, thus obtaining an answer to the following research question: What are the fields in which these concepts have been most explored?

The results obtained from bibliometric analysis were surprising, since the food field does not appear among the other ones. So, a content analysis was carried out iterating the literature review process on a lead subsample of papers to investigate how Human Factor is applied in food label design and if it was used to assure consumers' healthcare in food eating. The content analysis is a qualitative method for analysing the meaning of a study, allowing researchers to describe the topics and themes that are most meaningful to the research objectives of the study [59].

Following the approach proposed by ref. [60], a subsample composed by lead papers was defined and carefully analysed from a contents point of view. The criterion used to define the lead papers subsample are shown in Table 1. The subsample of analysis is composed by 7 works, as shown in Table 3.

Table 3. Works that composed the subsample of analysis.

Title	Authors	Year	Journal
Applying human factors to develop an improved package design for (Rx) medication drug labels in a pharmacy setting	Julie M. Gerhart, Holly Spriggs, Tonja W. Hampton, Rose Mary B. Hoy, Allison Y. Strochlic, Susan Proulx, Debra B. Goetchius	2015	Journal of Safety Research
Structure Matters: Effects of Semantic Relatedness and Proximity on Consumer Search and Integration Tasks	John Grishin, Douglas J. Gillan	2016	Proceedings of the Human Factors and Ergonomics Society 2016 Annual Meeting
Formatting Food Labels for Safety and Health: Finding the Ingredients Faster	John Grishin, Will Walkington, Michael S. Wogalter	2015	Proceedings of the Human Factors and Ergonomics Society 59th Annual Meeting
Improving Food Labels for Health and Safety: Effects of Ingredients List Placement on Search Times	John Grishin, Michael S. Wogalter, Will Walkington	2016	Proceedings of the Human Factors and Ergonomics Society 2016 Annual Meeting
Naming, labelling, and packaging of pharmaceuticals	John W. Kenagy, Gary C. Stein	2001	American Journal of Health-System Pharmacy
Configurable Displays Can Improve Nutrition-Related Decisions: An Application of the Proximity Compatibility Principle	Christopher J. Marino, Robert P. Mahan	2005	Human Factors
Using Human Factors Methods to Evaluate the Labelling of Injectable Drugs	Kathryn Momtahan, Catherine M. Burns, Jennifer Jeon, Sylvia Hyland, Sandra Gabriele	2008	Healthcare Quarterly

3. Results

In the following subsections, results coming from the two different analyses conducted, Bibliometric analysis and Systematic content analysis, are shown.

3.1. From Bibliometric Analysis

The sample of 219 papers was analysed in order to identify the research areas.

Bibliometric analysis was carried out in order to count the recurring terms in "Title" and "Abstract" and create a term co-occurrence map using Network analysis and graphical investigation. The minimal recurring term frequency chosen is 2. So, according to the full counting method, 622 terms recurred, but only 117 recurred the last 2 times. The term list was cleaned from numbers, common terms ("what," "fact," etc.), articles, verbs, conjunctions and other terms with low meaning, leaving active 113 terms. The network was composed of 6 clusters of themes, each one indicated by a different colour. Figure 4 encompasses the 6 clusters, the evolution over time of the general terms network and the focus of Human Factor node using the related image coming from VOSviewer.

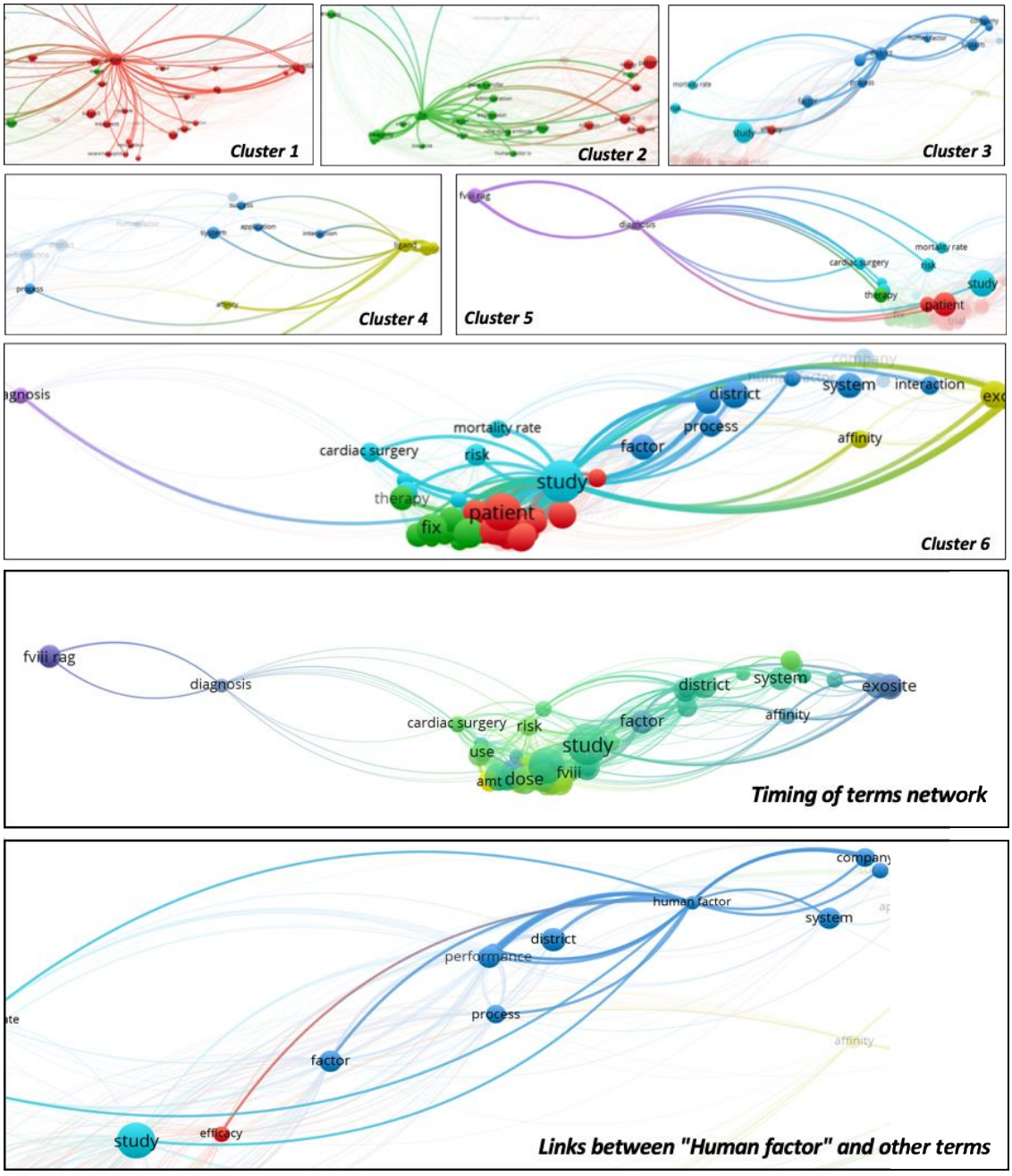

Figure 4. Terms Clusters coming from Bibliometric Analysis, Timing of terms network and Links between "Human Factor" and other terms.

Cluster 1 (red colour) was composed of 34 items referred to as the patient sphere, such as "patient," "prevention," "treatment," "trial," "safety," "human CL RHFVIII," etc.

Cluster 2 (green colour) was composed of 23 items referred to as the therapy sphere, such as "dose," "fix," "therapy," "vector," "gene transfer," etc.

Cluster 3 (blue colour) was composed of 22 items referred to as the organizational system sphere, such as "district," "performance," "system," "factor," "process," "company," "human factor," etc.

Cluster 4 (olive green colour) was composed of 12 items referred to as the biochemistry sphere, such as "ligand," "binding," "exosite," "affinity," etc.

Cluster 5 (lilac colour) was composed of 12 items referred to as the medical laboratory technology sphere, such as "FVII Rag," "diagnosis," "uea," "sinusoidal endothelial cell," etc.

Cluster 6 (light blue) was composed of 9 items referred to as the medical studies sphere, such as "study," "use," "risk," "mortality rate," "cardiac surgery," etc.

Figure 4 shows how these themes have evolved over time, where the blue nodes have been treated for a long time (since 2000) and the green and yellow ones are more recent (respectively, since 2010 and 2015).

It is interesting that all clusters denote a medical print but are never related to the Food Industry. Moreover, even if the term "label" was used as a selection keyword, it does not compare in any cluster. However, "human factor," present in Cluster 3, was related to the following concepts: "performance," "company," "success," "district," "process," "factor," "study," "mortality rate," "efficacy" (Figure 3).

Analysing this concept from a time point of view, it arose that "human factor" compares in the scientific scenario from 2012, underlying the novelty of the issue.

3.2. From Systematic Content Aanalysis

In order to identify how the relationship between "label" and "human factor" was treated in the Food Industry, the papers in Table 3 were analysed using systematic content analysis.

Ref. [8] propose a study focused on medications label design considering concepts related to Human Factor. The word "Food" arose only in relation to the regulation "US Food and Drug Administration (FDA)" that establishes the guidelines for labelling and packaging in the related industries. The authors proposing usability and validation tests, respectively on a sample composed of 8 and 25 people. Thanks to the information from the experiment, a new label with a high level of readability was defined. Also, ref. [61] consider the Human Factor in labelling of injectable medications in order to understand if bad readiness is the cause of the high number of in-hospital medication errors. In a survey conducted on doctors and medications, it arose that many medication labels do not comply with the Canadian Food and Drug Regulations for labelling. Also, ref. [62] focus on the same issue about medical errors related to naming, labelling, and packaging of pharmaceuticals, discussing how the medication-use system and drugs packaging do not consider the human factor.

Ref. [63,64] are similar studies where the authors analyse the velocity of the consumer to identify the ingredient list depending on its position on the label. Several hypotheses of influencing factors from literature are considered and several layouts were created for the same food product. Particularly in the layouts analysed were 4 and 30, for the first and second one, respectively. It arose that there is a correlation between the speed in ingredients list recognition and: i) its positioning in the label (top, bottom, right, etc.); ii) its adjacency with other elements (nutritional facts panel and other). Moreover, in ref. [63], authors study if positioning in label layout, items with semantic relatedness increase the readiness of label. Twelve label items were identified and, using a survey method, its semantic relatedness was identified. So, 3 layouts with similarity, dissimilarity, and random positioning were designed and administered to a sample of people. The results showed that search task performance improved according to semantic relatedness.

Ref. [65] investigate the relationship between nutrition label format and decision-making of consumers. The study was based on the theoretical principle of the Proximity Compatibility Principle (PCP). Three experiments were realized to present nutrient data with different levels of proximity in the design of label format. It arose that the decision performance in the context of nutrition labels

was better supported when the visual and cognitive processing requirements of decision-making were matched.

4. Discussion and Conclusions

The study starts from the assumption that labels represent the interface between the food system and consumers, and it could be designed according to Human Factor principles to assure safety and health. The results coming from the literature review were presented above and demonstrate how Human Factor was applied to label design. The following subsections discuss the results of the work and propose the conclusions of the study, including implications and potential applications, limitations, and future trends, to the best of our knowledge.

4.1. Discussion from Results

The first issue worthy of debate emerging from the bibliometric analysis is the predominance of terms coming from the medical world. This is also confirmed by the initial statistical analysis where the Medicine and Engineering fields were the ones that treated the relationship between "label" and "human factor" more. However, it is necessary to underlie the ambiguity of the meaning that words like "label" and "human factor" have in several contexts. In fact, even if in this work the "label" is understood as the physical interface between product and user/consumer, the term has been given a different meaning, particularly in the medical and pharmaceutical spheres (i.e., "open-label," "off-label"). In the same way, the terms "factor" and "human," not connected to each other, take on a more different meaning, most of which stem from medical and biomedical spheres (i.e., "human CL RHFVIII"). This could be the reason why there are many works from the medical field. Moreover, the term "human factor" appears in Cluster 3, with other terms referred to the organizational system. It comes related to concepts like "performance," "company," "success," "district," "process," "factor," "study," "mortality rate," "efficacy." Starting from this point of view, a second opportunity of debate emerges. Each term becomes more meaningful if located, another time, in the medical sphere. In fact, regarding the health organization, the terms deriving from the analysis could refer to an organizational system in which a multiplicity of different components (personnel, technology, environment) interacts in complex ways, always leaving the people (patients) at the centre of the system. The term "mortality rate," tied with "human factor," leads to a clinical risk management issue.

From systematic content analysis on the 7 papers that satisfy the selection criterion, two groups of works arose. The first one focused on the possibility to consider the human factor in pharmaceutical label design, in order to decrease the medical errors and preserve the patient's health. Even if these studies do not focus on food products, they could be considered because a high similarity between food and drugs products exists. Almost two common points could be identified: i) both kinds of products can be swallowed; ii) both products generate positive or negative effects on the human body, thus affecting consumers' healthcare. Therefore, it is not surprising that the U.S. Food and Drug Administration (FDA) treats the regulation about food and drug combinedly.

The second group of papers focused on the possibility to consider the human factor in food label design. All works study several layouts where the same contents are positioned in different ways in order to highlight several scopes, such as: increasing the recognition speed of content in a label, improving the label readiness, fostering the product decision-making. It arose that many studies show how much better the information on the label items represents the content; for example, the use of a picture, graph, or text to represent the same concept. Moreover, the label items were identified starting from the current food labels (e.g., list of ingredients, batch number, choking hazard, company logo, expiration date, nutrition fact, product logo, and so on) and no study identified the label items starting from the real needs of consumers about food product.

Effectively, even if an item is positioned for a faster recognition or a label is designed with a high level of readiness, it does not mean that the information is really interesting for the final consumers or really understandable.

In summary, what can be drawn from this research is:

- The "human factor" is applied to "label" design in the current scientific scenario.
- The main fields in which the relationship between "human factor" and "label" was more treated are Medicine and Engineering.
- The concept of "human factor" finds application in food label design as a strategy to increase the recognition speed of contents in a label, improve the label readiness, foster the product decision-making. These strategies could have an indirect effect on consumers' healthcare but this cannot be considered as assured.

4.2. Implications and Potential Application

From the study, it arose that the Human Factor is widely applied in the Medicine domain to improve the design of pharmaceutical labels in order to decrease medical errors, thus preserving the patient's health. Starting from the similarities between Drugs and Food products, discussed above, the connection between the two domains exists and is also underlined by FDA regulations. So, the results from drugs labelling design could be transferred to obtain the same objective in food labelling design: assuring the consumers health and safety.

The application of the Human Factor in label design, in particular in the food industry, shows some practical implications. Modern consumers are increasingly interested in health attributes and sustainability (environmental, economic, and ethical). It follows that a type of label, consisting of this information, needs to be presented to consumers, and can be applied not only in the medical and pharmaceutical fields but also in the agri-food sector. In this field, it will be possible to review the concept of labels in terms of contents and communication channels, considering also smart labelling. For reasons of space, current packaging and labels do not allow the consumers to be provided with Supplementary Information (carbon footprint, water footprint, company certifications, health claim, fair-trade, ecolabel, transformation product mode) any more than the mandatory one (Statement of Identity, Net Contents, Nutrition Facts Panel, Ingredient Statement, Statement/Warning on Allergen, Country of Origin, Name and Place of Business).

This limit would be surpassed by smart labels that could contain all the history related to the product. Furthermore, the use of a label that considers the principles of the Human Factor shows implications of public health and food safety. The possibility of communicating in detail the inputs and the technology used in the production process, the method of conservation, ingredients and allergens, the correct storage and use of the product, offers to the user a useful tool for reducing the health risk. For example, phenomena of chemical and microbiological alterations, with consequent damages to human health, can be avoided with correct information on cooking and storage methods.

4.3. Limitations and Future Trend

Despite the fact that the 3-step methodology was well established and two databases were considered in order to amplify the research spectrum, as widely justified in the Method section (Section 2), discrepancies or shortcomings should be noted. These derive from the different research standard settings in the databases, which for Web of Science were "Title" and "Topic," while for Scopus was "Article title, abstract, keywords." Even if "Topic" and "keywords" could be assimilable, the field "Abstract" in the first database does not compare, excluding, probably, several published works. However, this discrepancy does not exist in data analysis, where the term co-occurrence map was created, starting from the analysis of same fields for all works in the sample (Title and Abstract).

The Medicine field turned out to be the first field where human factor was applied in drug label design. So, it could be interesting to identify the best practices in this design and to study how these could be transferred in food label design.

As discussed above, all works in the food industry analyse several layouts in order to investigate how to better position the contents in a label. None of the work focussed on how to present the

information, with regards to better content understandability. Based on this evidence, it is therefore necessary to introduce communication models and strategies based on ethical principles in food label designing, with aims to increase the human factor. According to ref. [66], ethical communication is founded on five principles: truthfulness, authenticity (sincerity), respect, equity, and social responsibility; also because consumers expect that companies communicate sincerely, and hence appreciate more a vulnerable response than a defensive one [67].

So, based on consumers' needs about "wanting to know about food in order to eat safe and healthy," it could be possible to reshape the classical design of labels, both in terms of contents and communication channels, considering also virtual labels which are accessible from IT devices. It arose that, further research could be focused on the investigation about consumers' needs in terms of typology of contents related to food products. Downline, this analysis could be interesting to evaluate if the current companies' offers, in terms of labelling contents, are aligned with customer needs and, if so, if these products gain a wider market share. Indeed, another further research could be focused on the possibility to apply the ethical communication principles, stemming from philosophical matters to label design. Moreover, the use of virtual smart labelling in order to better fit with consumers' information needs and ethical communication principles could be studied.

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References

1. Moon, G.; Aitken, G.; Roderick, P.; Fraser, S.; Rowlands, G. Towards an understanding of the relationship of functional literacy and numeracy to geographical health inequalities. *Soc. Sci. Med.* **2015**, *143*, 185–193. [CrossRef] [PubMed]
2. Drichoutis, A.C.; Lazaridis, P.; Nayga, R.M.; Kapsokefalou, M.; Chryssochoidis, G. A theoretical and empirical investigation of nutritional label use. *Eur. J. Health Econ.* **2008**, *9*, 293–304. [CrossRef] [PubMed]
3. Lin, C.-T.J.; Lee, J.-Y.; Yen, S.T. Do dietary intakes affect search for nutrient information on food labels? *Soc. Sci. Med.* **2004**, *59*, 1955–1967.
4. Meyerding, S.; Schaffmann, A.-L.; Lehberger, M. Consumer Preferences for Different Designs of Carbon Footprint Labelling on Tomatoes in Germany—Does Design Matter? *Sustainability* **2019**, *11*, 1587. [CrossRef]
5. Garcia-Retamero, R.; Cokely, E.T. Designing Visual Aids That Promote Risk Literacy: A Systematic Review of Health Research and Evidence-Based Design Heuristics. *Hum. Factors: J. Hum. Factors Ergon. Soc.* **2017**, *59*, 582–627. [CrossRef] [PubMed]
6. Drogoul, F.; Kinnersly, S.; Roelen, A.; Kirwan, B. Safety in design—Can one industry learn from another? *Saf. Sci.* **2007**, *45*, 129–153. [CrossRef]
7. Grishin, J.; Wogalter, M.S.; Walkington, W. Improving Food Labels for Health and Safety: Effects of Ingredients List Placement on Search Times. *Proc. Hum. Factors Ergon. Soc. Annu. Meet.* **2016**, *60*, 1637–1641. [CrossRef]
8. Gerhart, J.M.; Spriggs, H.; Hampton, T.W.; Hoy, R.M.B.; Strochlic, A.Y.; Proulx, S.; Goetchius, D.B. Applying human factors to develop an improved package design for (Rx) medication drug labels in a pharmacy setting. *J. Saf. Res.* **2015**, *55*, 177–184. [CrossRef]
9. Mitchell, R.J.; Williamson, A.; Molesworth, B. Use of a human factors classification framework to identify causal factors for medication and medical device-related adverse clinical incidents. *Saf. Sci.* **2015**, *79*, 163–174. [CrossRef]
10. Makary, M.A.; Daniel, M. Medical error—The third leading cause of death in the US. *BMJ* **2016**, *353*, i2139. [CrossRef]
11. Onofrio, R.; Trucco, P. Human Reliability Analysis (HRA) in surgery: Identification and assessment of Influencing Factors. *Saf. Sci.* **2018**, *110*, 110–123. [CrossRef]

12. Grinnall, A.; Burnett, S. First Catch Your Fish: Designing a "Low Energy Fish" Label. *Sustainability* **2015**, *7*, 6086–6101. [CrossRef]
13. Przyrembel, H. Food labelling legislation in the EU and consumers information. *Trends Food Sci. Technol.* **2004**, *15*, 360–365. [CrossRef]
14. Goldberg, J.H.; Probart, C.K.; Zak, R.E. Visual Search of Food Nutrition Labels. *Hum. Factors: J. Hum. Factors Ergon. Soc.* **1999**, *41*, 425–437. [CrossRef] [PubMed]
15. Skurka, C.; Byrne, S.; Davydova, J.; Kemp, D.; Safi, A.G.; Avery, R.J.; Dorf, M.C.; Mathios, A.D.; Niederdeppe, J. Testing competing explanations for graphic warning label effects among adult smokers and non-smoking youth. *Soc. Sci. Med.* **2018**, *211*, 294–303. [CrossRef] [PubMed]
16. Jiang, Y.; Wang, H.; Jin, S.; Delgado, M. The Promising Effect of a Green Food Label in the New Online Market. *Sustainability* **2019**, *11*, 796. [CrossRef]
17. Krejci, C.C.; Stone, R.T.; Dorneich, M.C.; Gilbert, S.B. Analysis of Food Hub Commerce and Participation Using Agent-Based Modeling: Integrating Financial and Social Drivers. *Hum. Factors J. Hum. Factors Ergon. Soc.* **2016**, *58*, 58–79. [CrossRef]
18. Siegrist, M.; Hübner, P.; Hartmann, C. Risk Prioritization in the Food Domain Using Deliberative and Survey Methods: Differences between Experts and Laypeople: Risk Prioritization. *Risk Anal.* **2018**, *38*, 504–524. [CrossRef]
19. Jacinto, C.; Canoa, M.; Guedes Soares, C. Workplace and organisational factors in accident analysis within the Food Industry. *Saf. Sci.* **2009**, *47*, 626–635. [CrossRef]
20. Nayak, R.; Waterson, P. 'When Food Kills': A socio-technical systems analysis of the UK Pennington 1996 and 2005 E. coli O157 Outbreak reports. *Saf. Sci.* **2016**, *86*, 36–47. [CrossRef]
21. Hartmann, C.; Hübner, P.; Siegrist, M. A risk perception gap? Comparing expert, producer and consumer prioritization of food hazard controls. *Food Chem. Toxicol.* **2018**, *116*, 100–107. [CrossRef] [PubMed]
22. Gray, A. *A Handbook of Food Crime: Immoral and Illegal Practices in the Food Industry and What to Do about Them*; Policy Press: Bristol, UK, 2018; ISBN 978-1-4473-3602-0.
23. Wilkins, J.L. Eating right here: Moving from consumer to food citizen. *Agric. Hum. Values* **2005**, *22*, 269–273. [CrossRef]
24. Hassanein, N. Practicing food democracy: A pragmatic politics of transformation. *J. Rural Stud.* **2003**, *19*, 77–86. [CrossRef]
25. Urbany, J.E.; Dickson, P.R.; Kalapurakal, R. Price Search in the Retail Grocery Market. *J. Mark.* **1996**, *60*, 91. [CrossRef]
26. Tonkin, E.; Wilson, A.M.; Coveney, J.; Webb, T.; Meyer, S.B. Trust in and through labelling—A systematic review and critique. *Br. Food J.* **2015**, *117*, 318–338. [CrossRef]
27. Strawderman, L.; Koubek, R. Human factors and usability in service quality measurement. *Hum. Factors Ergon. Manuf.* **2008**, *18*, 454–463. [CrossRef]
28. Holstein, W.K. Alphonse Chapanis Human-Factors Engineering. Available online: https://www.britannica.com/topic/human-factors-engineering (accessed on 16 June 2019).
29. Card, S.K. *The Psychology of Human-Computer Interaction*; CRC Press: Boca Raton, FL, USA, 2017; ISBN 1-351-40946-8.
30. Foley, J.D.; Wallace, V.L.; Chan, P. The human factors of computer graphics interaction techniques. *IEEE Comput. Graph. Appl.* **1984**, *4*, 13–48. [CrossRef]
31. Jacko, J.A. *Human Computer Interaction Handbook: Fundamentals, Evolving Technologies, and Emerging Applications*; CRC Press: Boca Raton, FL, USA, 2012; ISBN 1-4398-2944-6.
32. Keim, D.; Andrienko, G.; Fekete, J.-D.; Görg, C.; Kohlhammer, J.; Melançon, G. Visual Analytics: Definition, Process, and Challenges. In *Information Visualization*; Kerren, A., Stasko, J.T., Fekete, J.-D., North, C., Eds.; Springer: Berlin/Heidelberg, Germany, 2008; Volume 4950, pp. 154–175. ISBN 978-3-540-70955-8.
33. Mohamed, E.S.; Abu-hashim, M.; AbdelRahman, M.A.E.; Schütt, B.; Lasaponara, R. Evaluating the Effects of Human Activity over the Last Decades on the Soil Organic Carbon Pool Using Satellite Imagery and GIS Techniques in the Nile Delta Area, Egypt. *Sustainability* **2019**, *11*, 2644. [CrossRef]
34. Goodrich, M.A.; Schultz, A.C. Human-Robot Interaction: A Survey. *Found. Trends Hum. Comput. Interact.* **2007**, *1*, 203–275. [CrossRef]

35. Hancock, P.A.; Billings, D.R.; Schaefer, K.E.; Chen, J.Y.C.; de Visser, E.J.; Parasuraman, R. A Meta-Analysis of Factors Affecting Trust in Human-Robot Interaction. *Hum. Factors J. Hum. Factors Ergon. Soc.* **2011**, *53*, 517–527. [CrossRef]
36. Steinfeld, A.; Fong, T.; Kaber, D.; Lewis, M.; Scholtz, J.; Schultz, A.; Goodrich, M. Common metrics for human-robot interaction. In Proceedings of the 1st ACM SIGCHI/SIGART Conference on Human-Robot Interaction—HRI '06, Salt Lake City, UT, USA, 2–3 March 2006; ACM Press: Boston, MA, USA, 2006; p. 33.
37. Lee, H.; Cha, W.C. Virtual Reality-Based Ergonomic Modeling and Evaluation Framework for Nuclear Power Plant Operation and Control. *Sustainability* **2019**, *11*, 2630. [CrossRef]
38. Tranfield, D.; Denyer, D.; Smart, P. Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review. *Br. J. Manag.* **2003**, *14*, 207–222. [CrossRef]
39. Ahmed, S.; Autrey, J.; Katz, I.T.; Fox, M.P.; Rosen, S.; Onoya, D.; Bärnighausen, T.; Mayer, K.H.; Bor, J. Why do people living with HIV not initiate treatment? A systematic review of qualitative evidence from low-and middle-income countries. *Soc. Sci. Med.* **2018**, *213*, 72–84. [CrossRef] [PubMed]
40. Saunders, M.; Lewis, P.; Thornhill, A. *Research Methods for Business Students*; Financial Times/Prentice Hall: Upper Saddle River, NJ, USA, 2009.
41. Rowley, J.; Slack, F. Conducting a literature review. *Manag. Res. News* **2004**, *27*, 31–39. [CrossRef]
42. Moher, D.; Liberati, A.; Tetzlaff, J.; Altman, D.G. The PRISMA Group Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLoS Med.* **2009**, *6*, e1000097. [CrossRef]
43. Van Leeuwen, T. The application of bibliometric analyses in the evaluation of social science research. Who benefits from it, and why it is still feasible. *Scientometrics* **2006**, *66*, 133–154. [CrossRef]
44. Yong-Hak, J. The Definitive Resource for Global Research Web of Science Access Powerful Cited Reference Searching and Multidisciplinary Content. Available online: https://libraryresearch.weebly.com/uploads/3/1/9/5/3195843/web_of_science_factsheet.pdf (accessed on 16 June 2019).
45. Mishra, D.; Gunasekaran, A.; Childe, S.J.; Papadopoulos, T.; Dubey, R.; Wamba, S. Vision, applications and future challenges of Internet of Things: A bibliometric study of the recent literature. *Ind. Manag. Data Syst.* **2016**, *116*, 1331–1355. [CrossRef]
46. Abdul Latif, S.; Omar, M.S.; Bidin, Y.H.; Awang, Z. Analyzing the Effect of Situational Factor on Recycling Behaviour in Determining the Quality of Life. *J. Asian Behav. Stud.* **2018**, *3*, 11. [CrossRef]
47. Flynn, K.; Villarreal, B.P.; Barranco, A.; Belc, N.; Björnsdóttir, B.; Fusco, V.; Rainieri, S.; Smaradóttir, S.E.; Smeu, I.; Teixeira, P.; et al. An introduction to current food safety needs. *Trends Food Sci. Technol.* **2019**, *84*, 1–3. [CrossRef]
48. Wang, J.; Ge, J.; Ma, Y. Urban Chinese Consumers' Willingness to Pay for Pork with Certified Labels: A Discrete Choice Experiment. *Sustainability* **2018**, *10*, 603. [CrossRef]
49. Rodríguez-Rojas, A.; Arango Ospina, A.; Rodríguez-Vélez, P.; Arana-Florez, R. ¿What is the new about food packaging material? A bibliometric review during 1996–2016. *Trends Food Sci. Technol.* **2019**, *85*, 252–261.
50. Dennis, W. Productivity among American psychologists. *Am. Psychol.* **1954**, *9*, 191–194. [CrossRef]
51. Price, D.D.S. A general theory of bibliometric and other cumulative advantage processes. *J. Am. Soc. Inf. Sci.* **1976**, *27*, 292–306. [CrossRef]
52. Cole, J.R.; Cole, S. The Ortega Hypothesis: Citation analysis suggests that only a few scientists contribute to scientific progress. *Science* **1972**, *178*, 368–375. [CrossRef] [PubMed]
53. Simonton, D.K. Creative productivity: A predictive and explanatory model of career trajectories and landmarks. *Psychol. Rev.* **1997**, *104*, 66. [CrossRef]
54. Lee, J.D.; Cassano-Pinché, A.; Vicente, K.J. Bibliometric Analysis of *Human Factors* (1970–2000): A Quantitative Description of Scientific Impact. *Hum. Factors J. Hum. Factors Ergon. Soc.* **2005**, *47*, 753–766. [CrossRef] [PubMed]
55. Hu, K.; Liu, J.; Li, B.; Liu, L.; Gharibzahedi, S.M.T.; Su, Y.; Jiang, Y.; Tan, J.; Wang, Y.; Guo, Y. Global research trends in food safety in agriculture and industry from 1991 to 2018: A data-driven analysis. *Trends Food Sci. Technol.* **2019**, *85*, 262–276. [CrossRef]
56. Suebsombut, P.; Sekhari, A.; Sureepong, P.; Ueasangkomsate, P.; Bouras, A. The using of bibliometric analysis to classify trends and future directions on "smart farm.". In Proceedings of the 2017 International Conference on Digital Arts, Media and Technology (ICDAMT), Chiang Mai, Thailand, 1–4 March 2017; pp. 136–141.
57. Van Oorschot, J.A.W.H.; Hofman, E.; Halman, J.I.M. A bibliometric review of the innovation adoption literature. *Technol. Forecast. Soc. Chang.* **2018**, *134*, 1–21. [CrossRef]

58. Van Eck, N.J.; Waltman, L. Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics* **2010**, *84*, 523–538. [CrossRef]
59. Williamson, K.; Given, L.M.; Scifleet, P. Qualitative data analysis. In *Research Methods*; Elsevier: Amsterdam, The Netherlands, 2018; pp. 453–476. ISBN 978-0-08-102220-7.
60. Fahimnia, B.; Sarkis, J.; Davarzani, H. Green supply chain management: A review and bibliometric analysis. *Int. J. Prod. Econ.* **2015**, *162*, 101–114. [CrossRef]
61. Momtahan, K.; Burns, C.M.; Jeon, J.; Hyland, S.; Gabriele, S. Using human factors methods to evaluate the labelling of injectable drugs. *Healthc. Q.* **2008**, *11*, 122–128. [CrossRef] [PubMed]
62. Kenagy, J.W.; Stein, G.C. Naming, labeling, and packaging of pharmaceuticals. *Am. J. Health Syst. Pharm.* **2001**, *58*, 2033–2041. [CrossRef] [PubMed]
63. Grishin, J.; Gillan, D.J. Structure Matters: Effects of Semantic Relatedness and Proximity on Consumer Search and Integration Tasks. *Proc. Hum. Factors Ergon. Soc. Annu. Meet.* **2016**, *60*, 1088–1092. [CrossRef]
64. Grishin, J.; Walkington, W.; Wogalter, M.S. Formatting Food Labels for Safety and Health: Finding the Ingredients Faster. *Proc. Hum. Factors Ergon. Soc. Annu. Meet.* **2015**, *59*, 1476–1480. [CrossRef]
65. Marino, C.J.; Mahan, R.P. Configural Displays Can Improve Nutrition-Related Decisions: An Application of the Proximity Compatibility Principle. *Hum. Factors J. Hum. Factors Ergon. Soc.* **2005**, *47*, 121–130. [CrossRef] [PubMed]
66. Baker, S.; Martinson, D.L. The TARES Test: Five Principles for Ethical Persuasion. *J. Mass Media Ethics* **2001**, *16*, 148–175.
67. Barwise, P.; Meehan, S. The one thing you must get right when building a brand. *Harv. Bus. Rev.* **2010**, 88–100.