Online Food Delivery: An Overview and Bibliometric Analysis

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Abstract: Academic works on online food delivery so far have focused on the economic and social aspects of OFD. The economic interest and evolution of this activity sector contrasts with a scarce and fragmented approach from the academic perspective. This work intends to account for the existing literature on online food delivery through a descriptive and bibliometric mapping analysis. A bibliometric analysis was performed using Microsoft Excel and VOSviewer, a platform for analysing bibliometric networks. The results show an increasing interest on the topic, that start booming in 2019. Sources that gather online food delivery articles usually belong to one of two kinds: 1) customer-related variables in tourism and hospitality and 2) business/management publications. Since it is an emerging research area, not many authors hold a distinguished position in terms of articles published, with leading authors holding no more than 4 articles. Analysing keyword co-occurrence we find differentiated thematic approaches: technological support and features of online food delivery, health issues related to food delivery, logistic chain of food delivery and a particular field of interest relating it to COVID-19. This work contributes to literature by outlining the different theoretical basis considered in OFD research, and providing practical implications for a variety of agents (suppliers, restaurants, retailers, etc.). Guidelines for future research are offered in this emerging and relevant field of interest.

Keywords: bibliometric analysis, online food delivery, food delivery app, tourism, restaurant, VOSviewer

1. Introduction

Online Food Delivery (OFD) is turning into a revolutionary paradigm when it comes to alternatives for demand of freshly-prepared meals. The expansion of the Internet and related digital technologies, such as portable devices; the social and cultural changes; and, more recently, the effects of the COVID-19 pandemic are the breeding ground for an industry that has rocketed in the past three years, reaching $150.000 million net worth worldwide and more than doubling income since 2017 (McKinsey, 2021). In hospitality, and particularly restaurants, OFD has grown for mitigating the effects of COVID-19 and lockdowns (Zhao and Bacao, 2020).

From a managerial and customer perspective, existing studies have focused on the triggering factors of OFD use, attitude and recommendation, mostly at an individual level (Ray *et al.*, 2019; Belarmino *et al.*, 2021). From a theoretical perspective, conceptual frameworks used to give sense to OFD explanatory factors move from the technological field, such as Technology Acceptance Model (TAM) or Unified Theory of Acceptance of User Technology (UTAUT), to other psychological models and theories such as Theory of Planned Behavior (TPB). Since we are dealing with a still novel research topic, and literature is somewhat emergent and fragmented, integration of existing works is needed.

The aim of this study is to carry out a bibliometric analysis on previous literature focusing on online-to-offline (O2O) food delivery platforms from a customer perspective with a special focus in the hospitality industry. More specifically, we intend to 1) establish different research topics that are being addressed in current OFD literature, 2) identify relevant authors and sources that stand out in the OFD research area, and 3) outline existing gaps that open new academic opportunities in topics related to OFD. Our contributions reside in the originality of the topic explored in the systematic review and bibliometric analysis, which is the first attempt to the best of the authors' knowledge, the consolidation of previous knowledge and the identification of research gaps for future developments of a research area of maximum interest in the managerial world.

2. Conceptual framework

The raise of OFDs is linked to the raising gig economy and its particular effects on work conditions, which are the result of combining two main triggering factors: the digital revolution and the advancements in terms of communication and service rendering in the online setting, and the success of the sharing economy in which peer-to-peer operations are highly successful (Vallas and Schor, 2020). The gig economy is giving rise to a new paradigm of business model, where jobs become more poorly paid and conditions are more unfair for workers, getting closer to blue-collar tasks. OFDs are a good example of this trend, as employees in charge of food delivery

(i.e. riders) have wrongly been considered as self-employed workers when they are actually working for a specific company. In this sense, recently enacted legislation imposes the burden of proof on employers (Reuters, 2021).

From an academic perspective, OFD have received increasing interest from a variety of disciplines. Works in the area of medicine and health have deepened on the role that food delivery as a cultural change is influencing problems such as sedentarism and obesity (Hughes *et al.*, 2020). In the field of computer science, data retrieval and configuration of food delivery services have also been approached (Yuen *et al.*, 2020). However, for the purpose of this work, we will focus our attention on business and marketing literature covering OFD.

2.1 Online food delivery in the customer context

Due to its practical relevance, several works have also approached the particularities of online food delivery in its different means from a business perspective, considering the importance of the processes and logistics in food delivery companies together with customer perceptions, attitudes and behaviors towards OFD.

In the business and marketing academic context, many studies from the tourism field have tried to know more about the antecedents of food delivery use, continuation and recommendation Muangmee et al. (2021) identified some, such as performance and effort expectancy, timeliness, and perceived trust and safety.

An important part of the literature deals with logistics and value chain particularities. These studies focus on the delivery process, transportation of the meals, and the role of workers or *riders* in this process. Niu et al. (2021) analyse the differences in willingness to pay and appropriateness in using self-logistics or a third-party OFD platform according to the market potential, as well as the impact on sales and sustainability.

Even though customer antecedents and delivery service are the most outstanding topics, other issues that have been covered so far in academia are the changes introduced in delivery processes and customer reactions to OFD as a result of COVID-19 impact (e.g. Gavilan et al., 2021), the creation and validation of measurement scales for particular OFD-related concepts (e.g. Chan and Gao, 2021), or qualitative approaches to specific cases on companies or geographical regions where OFD is rocketing (e.g. Zhao et al., 2021), amongst others.

2.2 Theoretical bases

Given the noticeable digital character of OFD alternatives for customers, there has been an important theoretical justification on theories such as Technology Acceptance Model (TAM, Davis, 1989) or Unified Technology Acceptance and Use Theory (UTAUT, Venkatesh et al., 2003). Choi, (2020) uses TAM to explain satisfaction and intention to reuse food delivery apps. Allah Pitchay et al., (2021) borrow four factors derived from UTAUT (i.e. social influence, information quality, price-saving orientation and time-saving orientation), which are found to significantly influence attitude towards OFD and the intention to adopt it.

The theory of Planned Behavior (TPB, Ajzen, 1985) has also been a fundamental framework to understand which are the motivations behind the adoption of this particular technology from a customer perspective. Hwang, Kim and Gulzar (2020), in their study about eco-impact of using drone food delivery services, tested how subjective norm and perceived behavioural control matched attitude toward the service in explaining behavioural intention, with awareness of consequence moderating such relationship.

In addition, there is a growing trend to combine different variables or theories to give a more comprehensive understanding of OFD adoption, which is understandable given the complexity and the myriad of factors that intervene in the customer interaction with OFD services. For instance, Troise et al. (2021) bind TAM with TPB to explain OFD services adoption to discover that subjective norm as an external influence has a deeper influence on behavioural attention that attitude towards OFD. Zhao and Bacao (2020) integrate UTAUT with the Expectancy Confirmation Model (ECM) and Task-Technology Fit (TTF) model and confirm that satisfaction plays a central role in use continuation of OFD, with perceived task-technology fit, trust, performance expectancy, social influence and confirmation also exerting a direct or indirect effect, during the COVID-19 pandemic.

3. Method

3.1 Sampling process

Data about the references used in the bibliometric analysis were download from the database Scopus. Scopus, handled by editorial Elsevier, is currently considered as one the highest-quality information aggregator about academic publications. This database contains high-quality data indexed through an accurate content selection and evaluation by an external Content Selection and Advisory Board, with almost 80 million records accumulated so far and an amount of approximately 3 million additions every year. Up to now, Scopus counts with 1.4 billion cited references, 70,000 institutional profiles, and 16 million author profiles. Its demonstrated quality records make of Scopus the chosen alternative for different bibliometric analyses (Baas *et al.*, 2020).

We performed a Boolean search to obtain our sample of references for the bibliometric analysis using the following terms: *online food delivery* OR *food delivery app* OR *food delivery mobile application* OR *food delivery aggregator* OR *online on-demand food delivery* OR *online food ordering*. We then limited the results to research articles as the only reference type, so that the considered references ensure the highest quality by having passed a double-blind peer review process. To ensure results reliability, we also focused on the Web of Science Core Collection. We focused on the "business, management and accounting" research area, and included all results published from 2010 till December 2021, and on references written in English. The search derived 154 results considered for the analysis.

3.2 Bibliometric analysis

Bibliometric analysis, one of the most important measures for the evaluation of scientific output, was applied to identify the range of scientific literature on online brand-centric relationships, describing the trends and main topics addressed. Bibliometric analysis identifies the most productive authors, the evolution of publications over time, the most influential articles and authors in a particular set of studies and the subjects most closely related to a specific research field (Veloutsou and Ruiz Mafe, 2020). After the sampling of academic references, we performed two different types of bibliometric analysis using Microsoft Excel and VOSviewer, a software platform for analysing bibliometric networks and graphically mapping results through clusters (van Eck and Waltman, 2010). The first consists of a co-occurrence analysis using author keywords, which establishes relationships and creates clusters based on how often two different keywords are used together in the sampled articles. The more times the keywords are used together, the closer they will be represented in a visual perspective. The second is a bibliographic coupling, using both sources and authors to group the different references based on these common elements.

4. Findings

4.1 Keyword co-occurrence analysis

To start with, we performed keyword data cleaning using a systematic approach with the 622 keywords employed in the sampled references. First, we proceeded to make similar words homogeneous: for example, *behavioural intention* and *behavioral intention*, or *continuance intention* and *reuse intention*, were all transformed into a common term to avoid misleading results. After the cleaning process, 583 keywords were considered for the following step. Second, we moved to the elimination of unrelated terms: this includes methodological terms (e.g. SEM, apriori algorithm) as well as general words or context (e.g. China, students) terms. The remaining 496 words were included in the analysis. Given the relatively low amount of references that have been published so far, we established a minimum threshold of 3 as a minimum of occurrences of the keyword, in order to avoid random results of keywords that are not truly related to the field of interest. In this way, we move from 496 to only 28 accepted keywords, which are listed in Table 1

As we can see, there are three keywords that outweigh the remaining results: *online food delivery*, *covid-19* and *food delivery app*. Logically, *online food delivery* acts as the central topic in this study, and hence holds the leading position in the studies considered. Very closely we find the impact of *covid-19* on the food delivery processes and the willingness to adopt and keep using OFD by customers. In the third place, we find *food delivery app* as the node for OFD supply and demand using digital, mobile technology. Of relevance are also *continuance intention* as one of the key dependent variables in business and marketing articles regarding OFD, and *e-commerce* as the research area where OFD is placed. Results of the graphical clustering can be seen in Annex 1

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Table 1: Keywords list

KEYWORD	NUMBER OF OCCURENCES	TOTAL LINK STRENGTH
online food delivery	35	28
covid19	26	29
food delivery app	24	31
continuance intention	12	17
e-commerce	9	6
online food ordering	8	6
service quality	7	9
attitude	5	6
customer satisfaction	5	8
food delivery aggregator	5	8
gig economy	5	3
restaurants	5	5
technology acceptance model	5	7
internet	4	6
online to offline (o2o)	4	4
technology	4	3
behavioral intention	3	4
food waste	3	4
intention to use	3	4
logistics	3	2
o2o	3	4
persuasion	3	3
platform economy	3	5
service delivery	3	2
social influence	3	5
sustainability	3	3

As a general finding, we can state that mobile apps and COVID-19 acts as a central issue in OFD literature, acting as a nexus between different topics, as they permeate different aspects of food delivery, including the demand as well as the production and transportation process. We can find four differentiated cluster based on the co-occurrence of keywords. In Cluster 1, we can find *antecedents of food delivery apps*. Explanatory variables for the use of mobile food delivery services linked to restaurants, such as online food aggregators, are mostly focusing on the technological side (*TAM*, *internet*) and the intention to use/adopt food delivery apps for the first time. Moreover, it holds one of the three central topics of OFD in the business context. In Cluster 2, we find topics related to *Covid-19 impact on online food delivery*. This is a very relevant cluster, as it contains two of the most used keywords: *online food delivery* and *covid-19*. The studies in this cluster focus very importantly on how *logistics* and the transportation process have changed due to the pandemic restrictions, and how it affected hospitality businesses related to freshly-prepared meals. The increased demand as well as the greater need for hygiene and disinfection in food products since Covid-19 poses a significant environmental impact (*food waste, sustainability*) which is starting to be considered in academia: how does the use of delivery alternatives (no plastic, drones, more efficient delivery plans) supports sustainability and is positively regarded by customers- In Cluster 3: we move to studies with less impact, yet still important. Basically, this cluster encompasses *context studies about OFD* in specific companies or geographical regions. One of the main topics of this group is related to the *gig economy* and *platform economy*, which involves that *technology* provides a different task organization and job model for OFD employees. In Cluster 4 we can find antecedents on the *continuation of use of OFD*. This is a relevant change, since the mechanisms that lead to the adoption or usage intention are not necessarily the same than the ones that promote *continuance intention*; this is why we find other antecedents related to previous experience in this cluster, such as *service quality* and *satisfaction* with the delivery service rendered by the restaurant or food delivery company. This theme is closely related to covid-19 as well, and the intention to stay demanding OFD once the restrictions for dining out are weaker.

4.2 Most productive journals in OFD literature

We then proceeded to perform a bibliographic coupling using the journals where the selected articles were published. For this analysis, we considered sources that had published at least 2 articles out of our initial sample. Out of the 74 sources, 26 met this criterion and are included in Table 2.

Table 2: Sources list

SOURCE TITLE	NUMBER OF DOCUMENTS	TOTAL LINK STRENGTH
british food journal	20	1323
international journal of hospitality management	13	804
international journal of contemporary hospitality management	8	652
international journal of recent technology and engineering	8	53
journal of retailing and consumer services	7	532
international journal of scientific and technology research	5	71
journal of distribution science	5	78
international journal of production economics	3	71
international journal of retail and distribution management	3	153
academy of entrepreneurship journal	2	6
applied geography	2	64
emerald emerging markets case studies	2	1
foresight	2	129
industrial management and data systems	2	14
international journal of consumer studies	2	165
international journal of logistics management	2	85
international journal of logistics research and applications	2	24
international journal of physical distribution and logistics management	2	21
journal of advanced transportation	2	35
journal of hospitality and tourism technology	2	94
journal of theoretical and applied electronic commerce research	2	248
prabandhan: indian journal of management	2	1
socio-economic planning sciences	2	20
technological forecasting and social change	2	79
transportation research part e: logistics and transportation review	2	1
work, employment and society	2	4

The most relevant journals in OFD from a customer perspective are focused on food (e.g. British Food Journal), hospitality/tourism (e.g. International Journal of Hospitality Management, International Journal of Contemporary Hospitality Management) and technology (e.g. International Journal of Recent Technology and Engineering). It is worth mentioning that other journals with a lower number of articles on OFD published still have a strong linkage to other sources. The network map can be found in Annex 2.

The main conclusion with this analysis comes with the configuration of two clusters. In Cluster 1, we find a set of journals closer to customer issues, mostly focused on the tourism and hospitality field, which accounts for the journals with the highest number of articles published, such as British Food Journal, International Journal of Hospitality Management, and International Journal of Contemporary Hospitality Management. In Cluster 2 we find a second, less prolific group of journals that are closer to corporate processes to deliver the freshly-cooked meal, including the International Journal of Production Economics, Industrial Management and Data Systems and International Journal of Logistics Management.

4.3 Most productive authors in OFD literature

Similarly, we performed a bibliographic coupling analysis using the authors of OFD articles as unit of analysis. We considered those who had written more than one paper on OFD and that were connected to other authors, leading to a final result of 20 valid data out of the 449 authors present in the initial sample. They are listed in Table 3.

Table 3: Authors list

AUTHOR	NUMBER OF DOCUMENTS	TOTAL LINK STRENGTH
dhir a.	4	1245
kaur p.	4	1245
bala p.k.	3	549
gunden n.	3	524
morosan c.	3	524
ray a.	3	549
talwar s.	3	957
al amin m.	2	486
arefin m.s.	2	486
chandrasekar k.s.	2	52
correa j.c.	2	138
defranco a.	2	426
fauzi a.a.	2	35
kumar s.	2	240
leung x.y.	2	113
rezaei s.	2	162
senthil m.	2	39
wang o.	2	214
wen h.	2	196

Taking a closer look at the results about fruitful authors in the OFD, we can derive two main conclusions. First, given the novelty of the topic, there are no clear "leaders" as only 2 authors account for a maximum of 4 research articles published in the field, and we find 5 other researchers with 3 publications, even more so if we consider that only 4.5% of the authors have more than one paper in this field. Second, two countries arise as prime movers in the field of OFD. India, with 6 of these authors, and US, with 5, account for the largest share of affiliated, most productive authors in this research area. South Africa also stands out with the 2 authors with the highest number of publications being affiliated at their North-West University. We now present the network map visualization in Annex 3.

Five clusters were derived. Cluster 1, considers a group of authors with geographical relationship, since all of them are affiliated to South-African universities. The authors within this cluster are specialized in the explanation of how customer values and motivations are important in the decision to adopt OFD. These authors hold the highest amount of articles, with two of them having published up to 4 articles. Cluster 2 includes authors based in India, with around 3 articles each. They deal with topics such as UGC and reviews, (emotional) reactions on OFD customers. Cluster 3 is formed by researchers for the University of Houston, US, who approach the persuasive effort on OFD based on visual cues and taking United States as the study context. Again, authors in this cluster have published around 3 articles about OFD. Cluster 4 is less homogeneous in geographical terms, with researchers from Colombia, United Kingdom, South Korea and India. Their research follows a more qualitative approach, using text mining techniques and analysing case studies. Cluster 5 encompasses authors who are less experienced in the field of OFD (with 2 articles published each), from different regions including Oceania, Asia and North America. Their topics of interest include different factors that affect the adoption of OFD. This general, yet transversal, topic acts as the central nexus in the map, as authors in Cluster 5 are dealing with topics that are applicable to the rest of clusters.

5. Discussion and conclusions

With this study, we intended to delve into existing academic research on the topic of OFD, knowing the current topics of interest, the state-of-the-art in geographical and source terms, and the future avenues of research that are opened. We made so by performing three different bibliometric analyses.

The keyword co-occurrence analysis is useful as an approximation to the topics of relevance in these 10-year research period. We found out that the main field of interest is that of antecedents for use of OFD, usually framed in the tourism and hospitality literature, including sociodemographic characteristics (Keeble *et al.*, 2020), perceptions (Gunden, Morosan and DeFranco, 2020), potential uses and gratifications (Ray et al., 2019) and technological factors (Troise *et al.*, 2021). Another important outcome of interest is the continuation after having

tried OFD services for the first time (Zhao and Bacao, 2020). In this sense, covid-19 and perceived security is crucial as an antecedent or moderator of such reuse in the hospitality industry (Gavilan *et al.*, 2021). From a more business perspective, works included in the gig economy deal with working conditions of OFD riders (Puram *et al.*, 2021) and logistic alternatives for food delivery (Niu *et al.*, 2021). There are few, yet relevant, attempts to know more about sustainability in FDAs (Vo-Thanh et al., 2021; Sharma et al., 2021).

The source bibliographic coupling analysis also derives interesting insights. We can find two main groups of journals publishing OFD-related research: one more focused on the customer perspective and the hospitality and tourism fields, with journals in the tourism field such as International Journal of Hospitality Management and Journal of Hospitality and Tourism Technology, and issues such as negative experiences and the negative effects of interaction with OFD (Jabeen *et al.*, 2022) or how visual cues in the OFD platforms also affect future intentions towards the service (Kumar, Jain and Hsieh, 2021), and another group more into the logistics and transportation process (Niu *et al.*, 2021).

The author bibliographic coupling analysis provides relevant information in terms of matureness and geographical evolution of the topic. We find prolific authors from India, US and South Africa, but very few have managed to publish more than 2 papers in the field. We also identify initially-defined research directions by group, with one general cluster that permeates the others. Nevertheless, we still face a rising, fragmented literature, with no well-established research lines.

6. Limitations and future lines of research

The current research is not without limitations. First, and due to the novelty of the topic, the number of references used for the study may not be enough to yield definitive results. Hence, we encourage future on this topic to check any differences while also establishing a temporal evolution of research on OFD. In this sense, a comparison of results pre- and post-covid-19 would also be of interest. Second, we focused on the area of business economics to carry out this analysis, but there are other related fields that could be included in future updates of this review, such as communication or psychology, which can be closely related to the field of marketing or consumer behaviour and may yield interesting insights about visual cues the reactions of customers to different inputs provided by OFD platforms in the case of psychology. Third, these results could be complemented with an additional co-occurrence analysis using citations as a unit of analysis, so that we can also verify which are the common references in which the studied articles are based. This was not included in the present work due to space limitations. Both, results of the bibliometric analysis and research limitations, open interesting avenues for future research in OFD, a relatively young and underexplored field.

6.1 Antecedents of OFD use and continuation after covid-19

Two of the main variables of interest of existing studies are both, the intention to use OFD services for the first time and the continuance intention after an initial experience with this alternative. There are two focal points that can be further researched here. First, the consideration of behavioural intentions towards OFD after restrictions of covid-19 have been dismantled. There are opinions against a similar use once restaurants are fully open and available for dining-out, whereas other voices argue that OFD is here to stay and will act as a complementary alternative to restaurant dining (Deliverect, 2021). Second, the effects on real behaviours, not just intentions, related to adopting and keep using OFD. Experimental designs should be carefully designed so that they study these behaviours in realistic scenarios

6.2 Further integration of theories

OFD platforms and apps require complex interactions where factors from different aspects (i.e. technological, personal, social, etc.) come into play. Therefore, future works should keep in the same direction than current ones that opt for this alternative (Zhao and Bacao, 2020; Troise *et al.*, 2021) and integrate concepts from different theoretical backgrounds to provide a comprehensive and heuristic approach to OFD interaction.

6.3 Sustainability and OFD

An important topic that has partially been covered by academia, but is extremely relevant in the managerial and societal world, is that of sustainable practices in OFD. Issues such as the use of plastics for meal packaging, the excessive food waste, and the pollution derived from last-mile deliveries are important aspects that have a strong footprint in the ecosystem. Fortunately, the use of recycled packaging (Liu *et al.*, 2020) or less

contaminating alternatives such as drones (Hwang, Kim and Gulzar, 2020) are studied and the effects on image perceptions considered, but there is still plenty of question marks in this aspect.
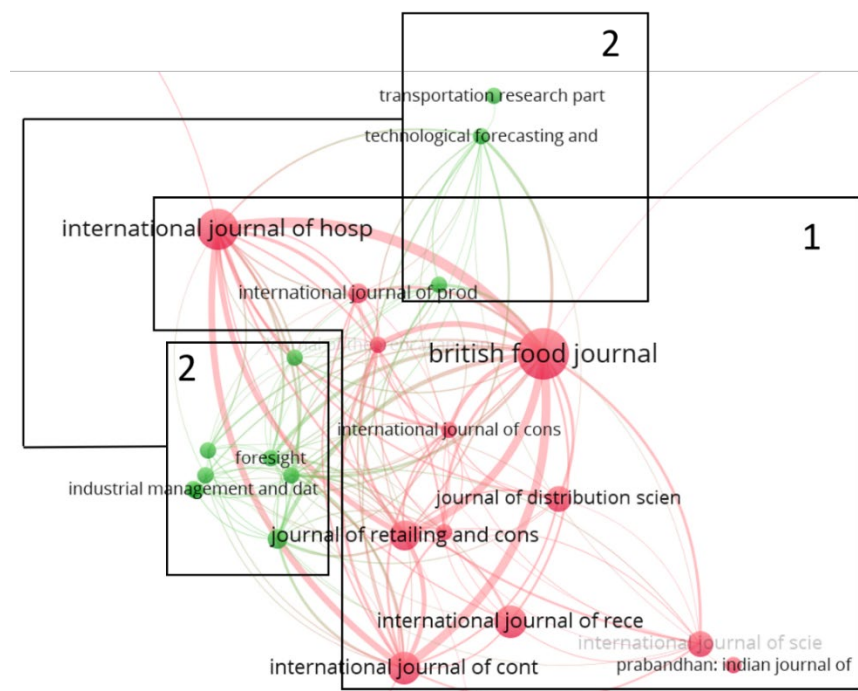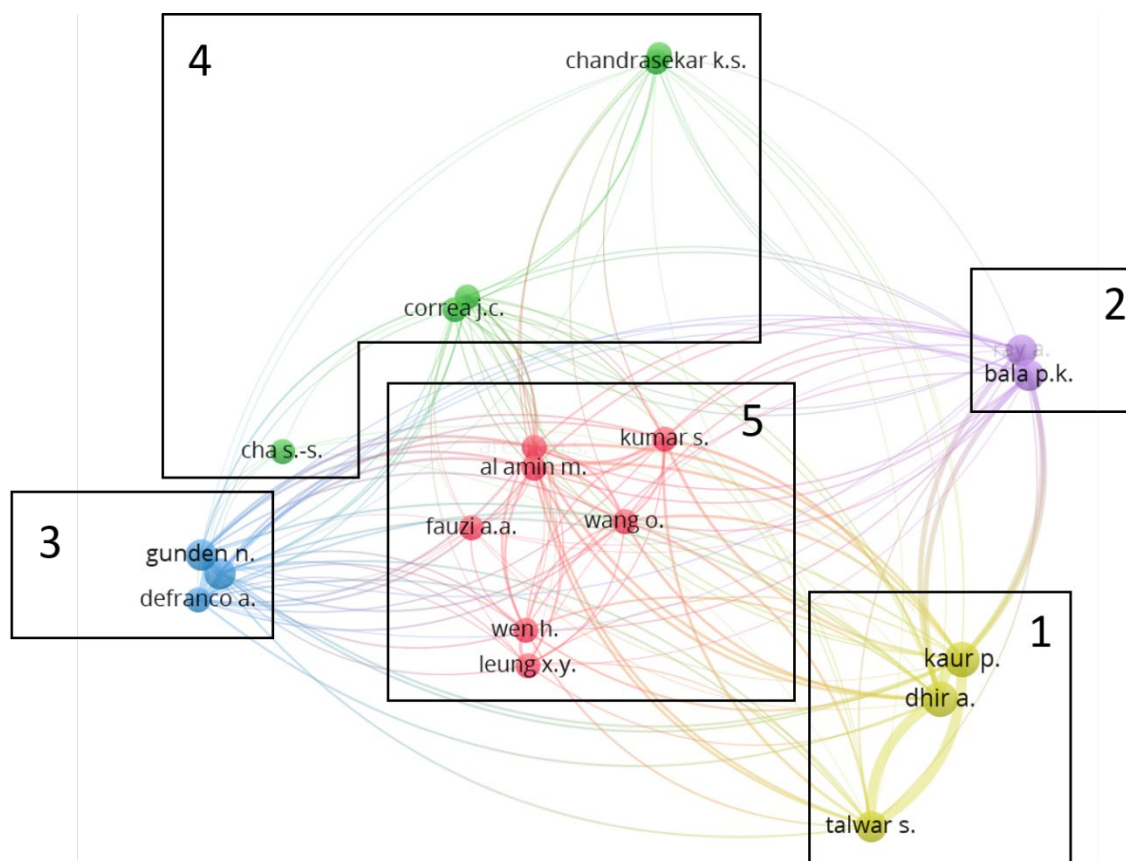
Acknowledgements

Appendix 1: Keyword co-occurrence network map
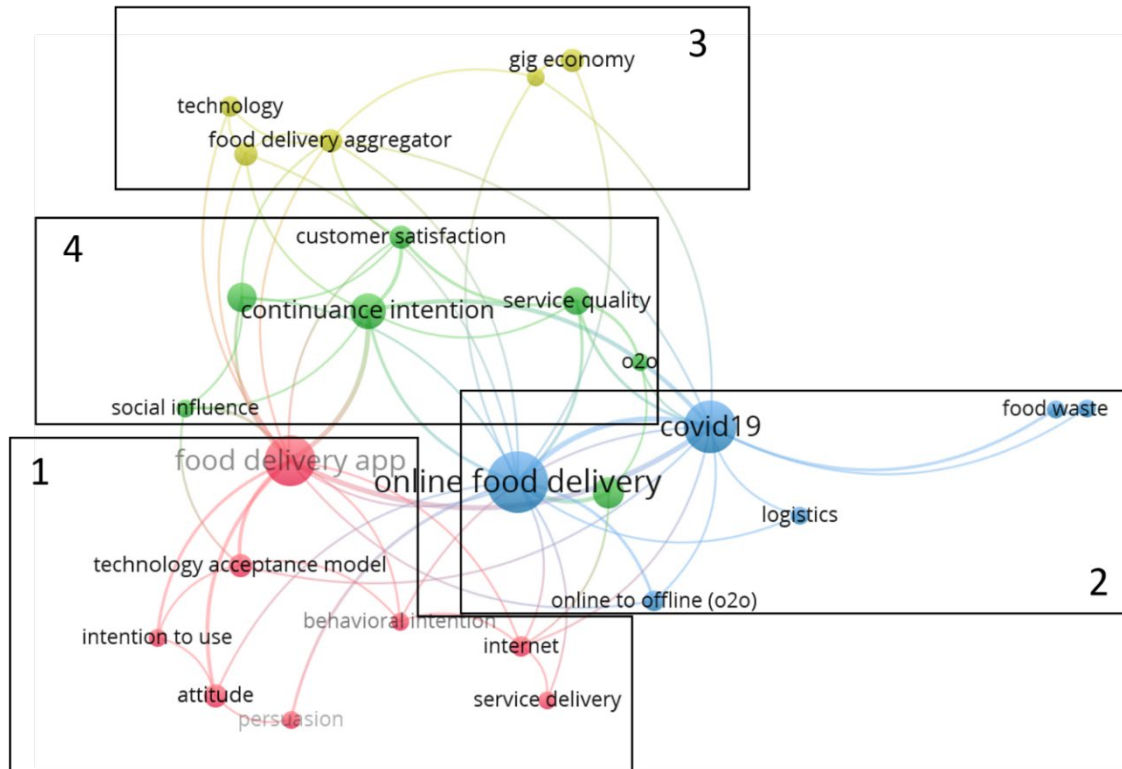
Appendix 2: Source bibliographic coupling network map

Appendix 3: Author bibliographic coupling network map

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