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A Project Report on

Survey on Crowdsourcing Technologies - Initial Experiences

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DECLARATION

We here by declare that the report of the B.Tech MAJOR PROJECT WORK entitled as “**Survey on Crowdsourcing Technologies - Initial Experiences**” which is being submitted to Rajiv Gandhi University of Knowledge Technologies, RK Valley, in partial fulfillment of the requirements for the award of Degree of Bachelor of Technology in Computer Science and Engineering, is a bonafide report of the work carried out by us. The material contained in this report has not been submitted to any university or institution for award of any degree.

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CERTIFICATE FOR PROJECT COMPLETION

This is certify that the project entitled “**Survey on Crowdsourcing Technologies - Initial Experiences**” submitted by K.Thanuja(R171023), K.Haritha(R171017), M.Yamuna(R161251), under our guidance and supervision for the partial fulfillment for the Degree of Bachelor of Technology in Computer Science and Engineering during the academic semester-II 2022-2023 at IIIT, RGUKT, RK VALLEY-AP. To the best of our knowledge, the result embodied in this dissertation work have not been submitted to any University or Institute for the award of any degree or diploma.

Project Internal Guide

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I. Abstract

Advances in technology and social media have facilitated the rapid development of crowdsourcing as an innovative tool within the field of marketing. This has driven researchers to investigate more deeply the phenomenon of crowdsourcing as a marketing innovation. The overall purpose of this thesis is expressed as: To explore and describe the use of crowdsourcing within the field of marketing. More specifically, the primary purpose of the thesis is to understand better - How crowdsourcing can be used as a marketing tool. This thesis aims to illuminate the gap in the extant marketing literature by reviewing current academic knowledge surrounding crowdsourcing and marketing. The use of the crowd as a marketing tool is growing primarily because of the advent of the Internet; however, as technology continues to advance the possibilities, challenges and side effects of crowdsourcing also change.





Most research on crowdsourcing focuses on the marketing activities and how crowdsourcing is a positive marketing tool. Much less research aims its attention on the consequences and/or potential negative aspects of crowdsourcing.

The emergence and development of crowdsourcing provide a new way of business or organization innovation. Crowdsourcing model is researched based on the theoretical analysis eight cases study. First, the concept of crowdsourcing is defined from the perspective of theoretical analysis. Its general process is summarized. Compared to outsourcing their similarities and differences are summed up. Its emergence reason and advantages are analyzed based on transaction cost theory and business management theory. Related research of participate motivation is reviewed. The problems and limitations are pointed out. Then the theoretical framework of crowdsourcing model is established. Second, based on the theoretical framework, two successful crowdsourcing cases are selected to study on six dimensions. New findings are obtained. The crowdsourcing model is understudied clearer and deeper. Some further research points are found. The conclusion can provide theoretical and practical support of crowdsourcing model for researchers and companies.

Over the years a great number of different websites have emerged that offer crowd-sourcing services, which aim at taking advantage of the vast number of anonymous workers globally available to complete tasks. In this paper we review and analyze existing websites providing crowdsourcing services in an attempt to establish a framework that will allow systematic discussion, comparison and assessment of existing crowdsourcing platforms.

Crowdsourcing is used increasingly in health and medical research. Crowdsourcing is the process of aggregating crowd wisdom to solve a problem. The purpose of this systematic review is to summarize quantitative evidence on crowdsourcing to improve health.

Methods followed was Cochrane systematic review guidance and systematically searched seven databases up to September 4th 2019. Studies were included if they reported on crowdsourcing and related to health or medicine. Studies were excluded if recruitment was the only use of crowdsourcing. We determined the level of evidence associated with review findings using the GRADE approach.

As academic and practitioner studies on crowdsourcing have been building up since 2006, the subject itself has progressively gained in importance within the broad field of management. No systematic review on the topic has so far appeared in management journals, however; moreover, the field suffers from ambiguity in the topic's definition, which in turn has led to its largely unstructured evolution. The authors therefore investigate the existing body of knowledge on crowdsourcing systematically through a penetrating review in which the



strengths and weakness of this literature stream are presented clearly and then future avenues of research are set out. The review is based on 121 scientific articles published between January 2006 and January 2015. The review recognizes that crowdsourcing is ingrained in two mainstream disciplines within the broader subject matter of innovation and management: (1) open innovation; and (2) co-creation. The review, in addition, also touches on several issues covered in other theoretical streams: (3) information systems management; (4) organizational theory and design; (5) marketing; and (6) strategy. The authors adopt a process perspective, applying the 'Input-Process-Output' framework to interpret research on crowdsourcing within the broad lines of: (1) Input (Problem/Task); (2) Process (session management; problem management; knowledge management; technology); and (3) Outcome (solution/ completed task; seekers' benefits; solvers' benefits). This framework provides a detailed description of how the topic has evolved over time, and suggestions concerning the future direction of research are proposed in the form of research questions that are valuable for both academics and managers.

Crowd sourcing is evolving as a distributed problem-solving and business production model in recent years. In crowd sourcing paradigm, tasks are distributed to networked people to complete such that a company's production cost can be greatly reduced. In 2003, Luis von Ahn and his colleagues pioneered the concept of "human computation", which utilizes human abilities to perform computation tasks that are difficult for computers to process. Later, the term "crowdsourcing" was coined by Jeff Howe in 2006. Since then, a lot of work in crowd sourcing has focused on different aspects of crowd sourcing, such as computational techniques and performance analysis. In this paper, we give a survey on the literature on crowd sourcing which are categorized according to their applications, algorithms, performances and datasets. This paper provides a structured view of the research on crowd sourcing to date.



II.Introduction

Crowdsourcing involves obtaining work, information, or opinions from a large group of people who submit their data via the Internet, [social media](#), and smartphone apps.

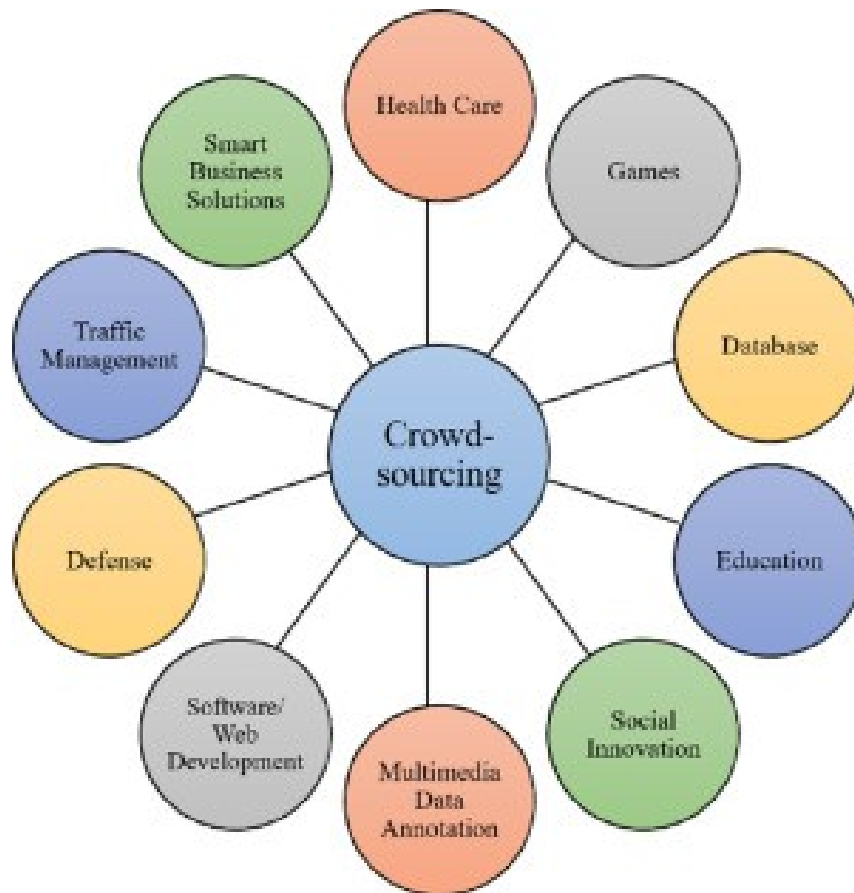
People involved in crowdsourcing sometimes work as paid [freelancers](#), while others perform small tasks voluntarily. For example, traffic apps like Waze encourage drivers to self-report accidents and other roadway incidents to provide real-time, updated information to app users.

The recent evolution of the information and communication technologies, the web 2.0 framework and the use of Internet as communication tool among users has provided several impacts in society, which led to the rise of new means of work, relationships and cooperation. The new ability to interact among participants and the possibility to reach much further and to a broader population has provided the emergence of a new type of economic relations among participants called collaborative economy or sharing economy (Lessig, 2008). To understand this new approach it can be used the definition of collaborative economy as “an economic model where ownership and access are shared between corporations, startups, and people. This results in market efficiencies that bear new products, services, and business growth” (Owyang et al., 2013). Among the different features, activities and processes included in this new economy it can be found the term crowdsourcing, which defines the participation of the “crowd” as a resource involved in one or more parts of a company business processes. This is an activity that encompasses remote ownership and access to stages of the process shared between companies and people outside them.

As a digital technique, crowdsourcing is part of the movement toward the digitalization of marketing, which is part of the rapidly growing digitalization of business in general. Competitive pressure drives digital marketing efforts (Tiago & Veríssimo, 2014), hence along with it the use of innovative digital techniques like crowdsourcing in marketing efforts. The importance of digital marketing is that it should lead to higher customer engagement and better relationships with customers.

Vukovic, Das, & Kumara (2013) provide a bridge from Web 2.0 crowdsourcing to Web 3.0 crowdsourcing as they looked at the crowd as a sensor rather than the technology-based sensors described herein. However, these scholars called for further crowdsourcing research in this area as system complexity grows and more advanced

applications are deployed. In other words, they pointed out the need for more research in crowdsourcing as the IoT's, AI and other human-computer interaction devices are deployed. This is the environment business faces today.



“crowdsourcing”, which rely on the motto “Everyone Knows Something” (Adamic et al. 2008). Crowdsourcing is the practice of obtaining services, ideas or content needed and solutions to problems in general by soliciting contributions from a large group of people, and, in particular, from an online community, rather than from traditional employees or suppliers (Zhao, Zhu 2012). This process is often used to subdivide tedious work or to fund-raise start-up companies and charities, and may also



occur offline. Crowdsourcing combines the efforts of numerous self-defined volunteers or part-time workers, where each contributor of their own initiative adds a small portion to the greater result. Practically, during crowdsourcing, a user (called the “requester”) requests an amount of work – which can be associated with some form of payment – from an open, undisclosed set of contributors (called “workers”). Workers can browse through existing tasks and complete them for a monetary payment set by the requester who can ask that workers fulfil certain qualifications before engaging in the task at hand. They may also set up a test in order to verify workers’ qualifications.

Requesters can also accept or reject the ‘product’ sent by a worker, which reflects on the worker’s reputation. Crowdsourcing has proven to be well-suited for accomplishing certain kinds of tasks.

Crowdsourcing is a web based business pattern, which make best use of the individuals on the internet, through open call, and finally get innovative solutions . In a word, crowdsourcing is a distributed problem solving pattern. Tasks are made known to the unknown public with public tender, most through online community, they also submit their solutions through it. Sometimes, the public take part in the appraisal and selection process, and choose the best solution. The final solution was owned by the one who propose the task, and the one who won may get cash incentives.

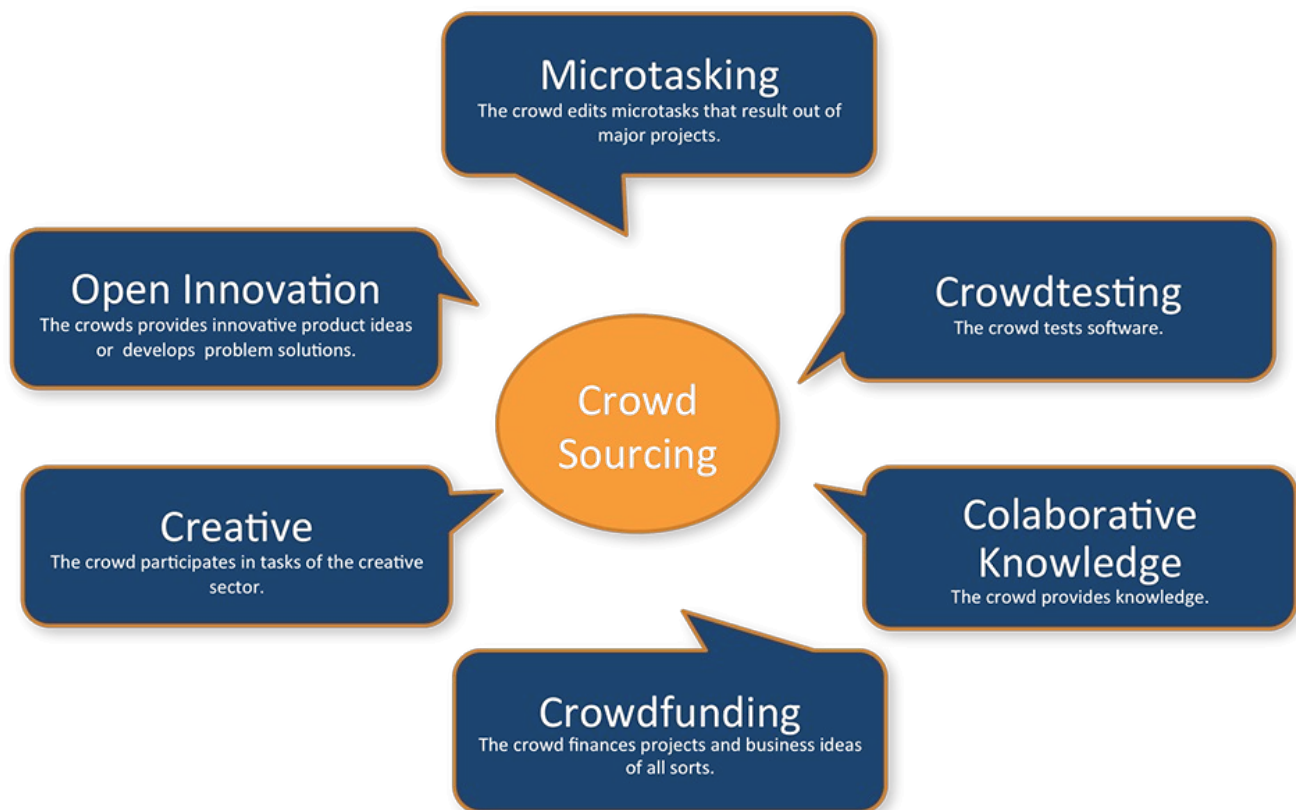


III. Literature Survey

Crowdsourcing is the act of outsourcing tasks traditionally performed by an employee or contractor, to an undefined, large group of people or community (a "crowd"), through an open call. The task can be done collectively with more than one people if necessary, but most of the time, it is done by one person. Crowdsourcing depends essentially on the fact that it is an open call to an undefined group of people, those most fit to perform the tasks. It breakthrough the boundary of companies or organizations, and outsourcing the tasks to public; it is a open call; and also emphasis the importance of large-scaled potential labor. Crowdsourcing is a web based business pattern, which make best use of the individuals on the internet, through open call, and finally get innovative solutions . In a word, crowdsourcing is a distributed problem solving pattern. Tasks are made known to the unknown public with public tender, most through online community, they also submit their solutions through it. Sometimes, the public take part in the appraisal and selection process, and choose the best solution.The final solution was owned by the one who propose the task, and the one who won may get cash incentives. The general process of crowdsourcing is as follows:

- Crowdsourcer(mostly companies or other organizations) propose tasks, and make it known to the public through internet or other media, at the same time, make clear the requirement of the solution and reward to the winners.
- The public submit potential solutions;
- The public or investigate, or evaluate the solutions, and choose the best one;
- Crowdsourcer determines the best solution, and reward the winner.
- Crowdsourcer gets and owns the best solution.

Although crowdsourcing has become popular, it also caused endless controversy. Some critics argue that low cost is achieved by exploitation and abuse of labor. For professionals engaged in certain industries, crowdsourcing make them panicked, and drop their income. Some also suggested that, the hidden costs are even higher than the traditional way, for the participation of a large amount of labors, although it does reduce the explicit costs. It is clear that, there exist some limitations and problems about crowdsourcing.The take types are limited. Most of crowdsourcing are done through the Internet, so the tasks are mainly creative projects that can be delivered by the network. It may bring additional costs so as the complete the project.



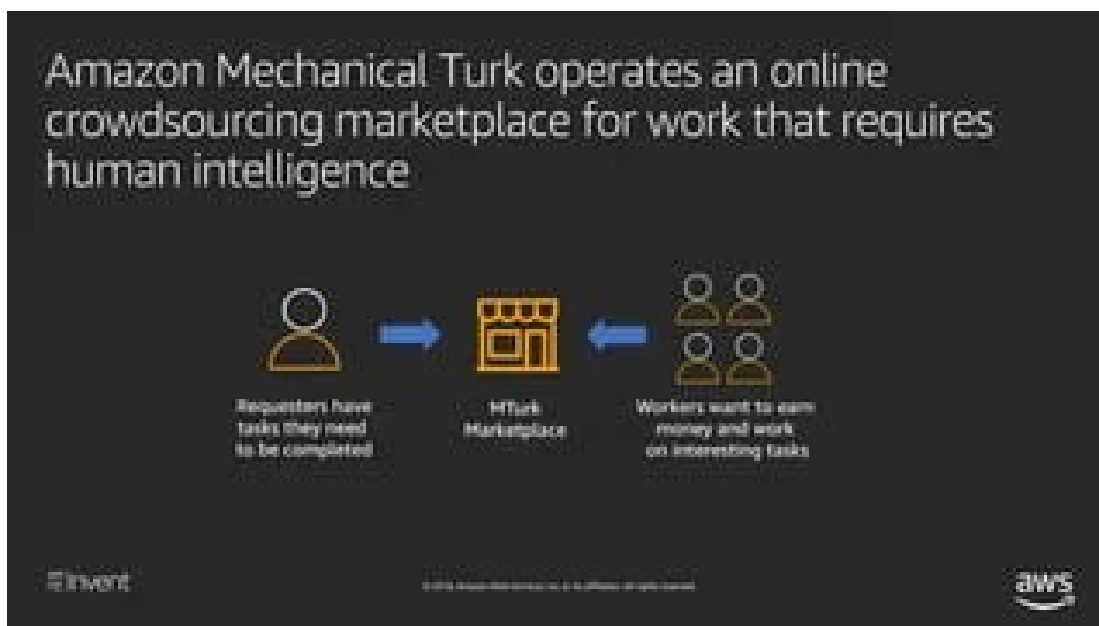
Crowdsourcing often includes select the most appropriate solution in thousands of, even millions of submits, so in addition to the remuneration paid to the winner, release the task, and solution selection may also bring some costs. It is risky. A crowdsourcing project may fail because of lack of financial support, not enough participants, low quality, language barriers, or difficulties in managing large projects. Meanwhile, in the crowdsourcing process, organizations may meet difficulties in the management and control of participant, for they don't have an employer-employee relationship. Considering the participants, their interest may be harmed, for not signed any written contract or confidentiality agreements with the organization. The concepts of crowdsourcing, user-generated content (UGC), and co-creation is often seen as closely related to user innovation. UGC can be defined as "media content created or produced by the general public rather than by paid professionals and primarily distributed on the Internet" (Daugherty, Eastin, & Bright, 2008, p. 19). In other words, it is content produced by the crowd. The improvements and extensive

growth of Web 2.0 technologies have led to an explosion in the creation and distribution of UGC.

How Does Amazon Mechanical Turk Use Crowdsourcing?

Amazon's Mechanical Turk (MTurk or AMT) is a crowdsourcing marketplace that businesses or researchers can use to outsource parts of their jobs, everything from data validation to finding survey respondents to content moderation. Anyone can sign up through their Amazon account to be a Mechanical Turk Worker.

Netflix uses crowdsourcing to help improve its entertainment platform. Most notably, in 2006, it launched the Netflix Prize competition to see who could improve Netflix's algorithm to predict user viewing recommendations and offered the winner \$1 million.



IV. Main findings of survey

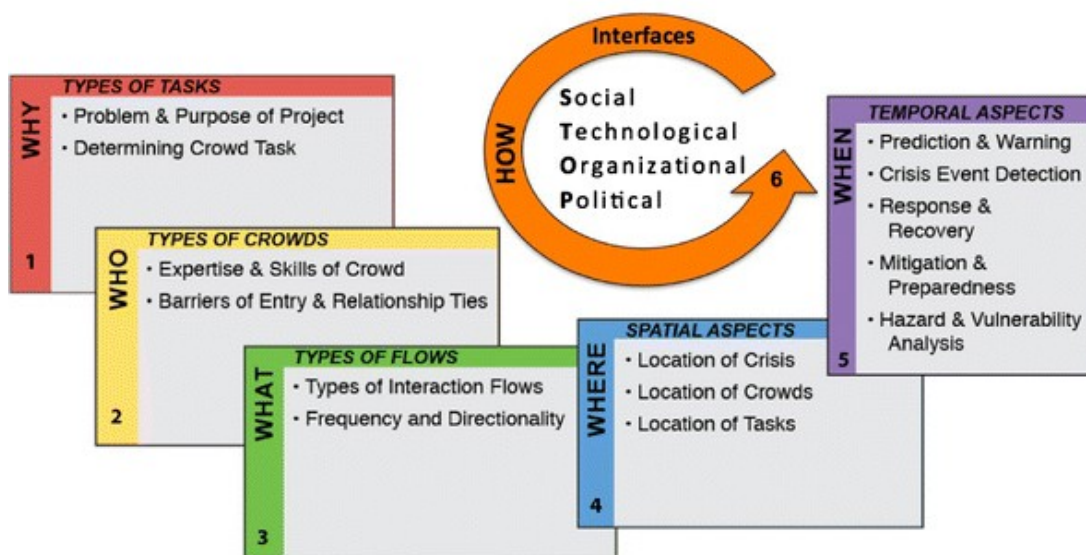
4.1 Pros of crowdsourcing:

- Crowdsourcing offers high probability of success
- Crowdsourcing saves costs and time
- Building customer contact and database
- Gain brand ambassadors - or even employees

4.2 Cons of crowdsourcing:

- Risk of internal disputes
- Risk of manipulation
- Risk of image loss
- Lack of confidentiality or ownership of an idea
- Potential to miss the best ideas, talent, or direction and fall short of the goal or purpose

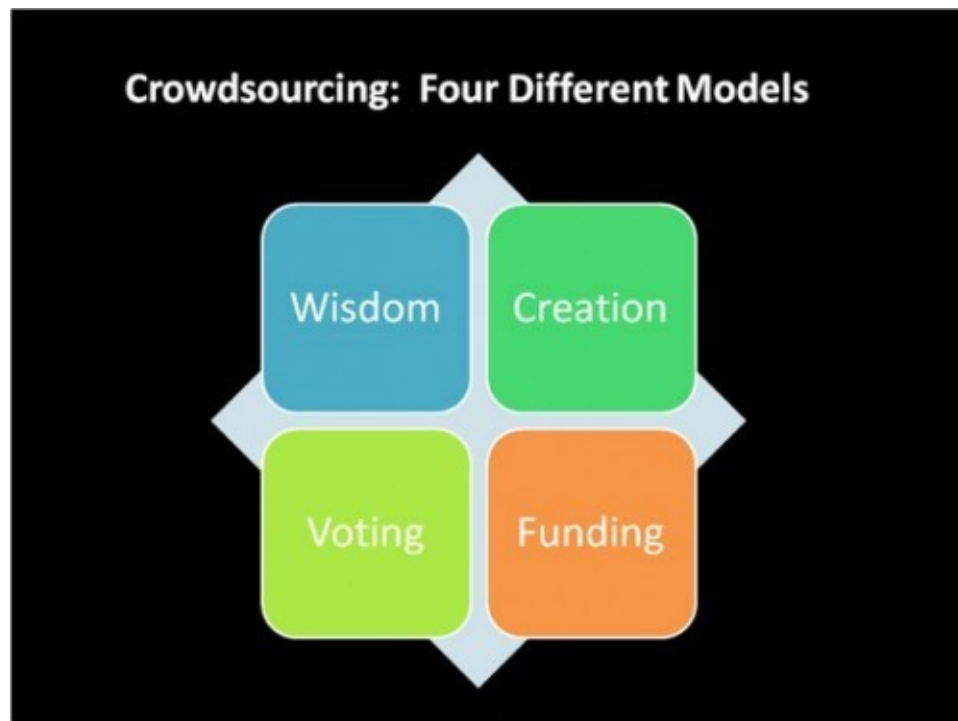
Crisis Crowdsourcing Framework



4.3 Types of Crowdsourcing:-

Crowdsourcing involves obtaining information or resources from a wide swath of people. In general, we can break this up into four main categories:

- **Wisdom** - [Wisdom of crowds](#) is the idea that large groups of people are collectively smarter than individual experts when it comes to problem-solving or identifying values (like the weight of a cow or number of jelly beans in a jar).
- **Creation** - Crowd creation is a collaborative effort to design or build something. Wikipedia and other wikis are examples of this. [Open-source](#) software is another good example.
- **Voting** - Crowd voting uses the democratic principle to choose a particular policy or course of action by "polling the audience."
- **Funding** - Crowdfunding involved raising money for various purposes by soliciting relatively small amounts from a large number of funders.





Here are some examples of large enterprises that are using crowdsourcing for innovation:

Lego DesignByMe – Lego have crowdsourced the design of many of their new products. By providing downloadable design software that runs on customers' machines, they can design and build their own Lego online and then purchase the very concept they created. By engaging their customers alongside their in-house a creative department, they are able to accurately gauge customer needs, spot trends and judge the potential size of the market for each product set. Lego also report that their design costs have been reduced to a staggeringly low level while increasing customer satisfaction to practically 99.9%.

Harley Davidson - utilizing a crowdsourced 'virtual creative department' listing 3,200 international participants to create a market overview out of the ideas of thousands of participants, as well as guide the marketing model for the brand. After 31 years with ad agency Carmichael Lynch, Harley Davidson is basing its core creative marketing development on CS, as participants are receiving assignment briefs on the Squirrel Fight 'digital engine' via Harley Davidson's new ad partner – V&S.

P&G - Procter & Gamble is utilizing crowdsourcing in such a way it accounts for more than 50% of its product initiatives. P&G is systematically crowdsourcing ideas involving packaging, design, marketing models, research methods, engineering, technology and more, as its Connect + Develop initiative already resulted more than 1,000 active agreements.

Kraft Foods – the company recently created a promotional entertainment film for its Lacta chocolate bar in Greece. The only twist is that the entire film, from the script to the actors, was crowdsourced to the public. The film, titled 'Love in Action' was viewed by more than 335K Greek viewers on TV, attracting 12% of all national viewers.

Nokia Labs– Nokia invites customers to test pre-commercialized apps. By crowdsourcing customer feedback and testing to a user community they can market test their new applications and get ideas for further development. As 'graduated' apps are released in their final versions, the ones that don't make it are archived for future reference. Nokia's crowdsourcing platform includes a discussion board and a user experience survey.

GE's Ecoimagination Challenge – crowdsourcing smarter power grids and energy technology solutions. GE invested \$100M in the challenge which was matched by 4 venture capital firms. Participants were offered incentives in the form of funding. Winners include Capstone Metering LLC, ElectricRoute and GridON.

Sony's Open Planet Ideas – In collaboration with the World Wide Fund for Nature (WWF), Sony launched the Open Planet Ideas initiative in order to crowdsource the next



breakthrough environmental solution from the public, while, at the same time, it provided opportunities to repurpose the company's own technology.

Using Crowdsourcing to build Customer Engagement

Some great examples of large enterprises that are using crowdsourcing to engage customers and broader constituent groups include the following:

InterContinental Hotels Group (IHG) - the Priority Club Rewards and Chase loyalty program. IHG turned to Communispace, a provider of private online communities, to rally a pool of 300 current Priority Club Visa cardholders willing to share their opinions on what card benefits and services they would want. Six months later, the community continues to serve as a learning mechanism for Priority Club Rewards, helping with both ideation and customer service.

My Starbucks Idea - launched by the coffee company in order to crowdsource ideas generation to its customers. The website enables the company's audience to vote on ideas, give mutual feedback, discuss and collaborate. This is a great way for Starbucks to increase customer engagement as well as publicity, and of course generate an overview / flow of suggestions to the company from a brand & customer perceptive.

Yahoo! Pipes - a web application by Yahoo! crowdsourcing online content aggregation, manipulation, and mashup to logged-in Yahoo! users. Pipes' graphic interface enables users to pipe information from different sources and set guidelines for content modification, resulting user generated 'web apps' put together to serve specific user needs.

Best Buy's IDEAX - launched by the retail giant in order to crowdsource feedback, ideas, and business improvements from their customers. Users can vote for ideas they favor and engage the community and other members, increasing Best Buy's own engagement within the consumer market.

Identification of crowdsourcing models and dimensions

The review of the literature on crowdsourcing produced a significant number of models and taxonomies, each one of them providing some characteristics of those initiatives that allowed their classification or categorization. Those characteristics were defined as dimensions for the model presented in the thesis.

The analysis of those dimensions finalized with different sets of them, grouped by similarities in the part of the crowdsourcing process that they address. For each group different authors were found to identify dimensions, which in several cases were similar but also complementary. Eventually these groups would be the potential elements of the organizational levels that made the initial framework model and the detailed one.

Additionally, these groups of dimensions provided an introduction to the impact these processes had in existing or new organizations and were the basis for the models presented in this document.

4.4 Example 1: Coming to the health research we have

Crowdsourcing approaches are increasingly used in public health and medicine. Examples include engaging youth in developing HIV services, designing a patient-centered mammography report, and enhancing cancer research. Some crowdsourcing approaches focus on the process of mass community engagement, obtaining creative input from many individuals. Other work has focused on the collective input of participants to generate a single, high-quality output such as clinical algorithms . The crowd in crowdsourcing may be members of the general public or individuals with specific clinical expertise . Recognizing the growing importance of crowdsourcing, the United Nations International Children's Emergency Fund (UNICEF)/ The United Nations Development Programme (UNDP)/World Bank/ The World Health Organisation (WHO) Special Programme for Research and Training in Tropical Diseases (TDR) published a practical guide on crowdsourcing in health and health research



Fig1:Process of using crowdsourcing to evaluate surgical performance



Fig2: Process of using crowdsourcing to increase HIV testing

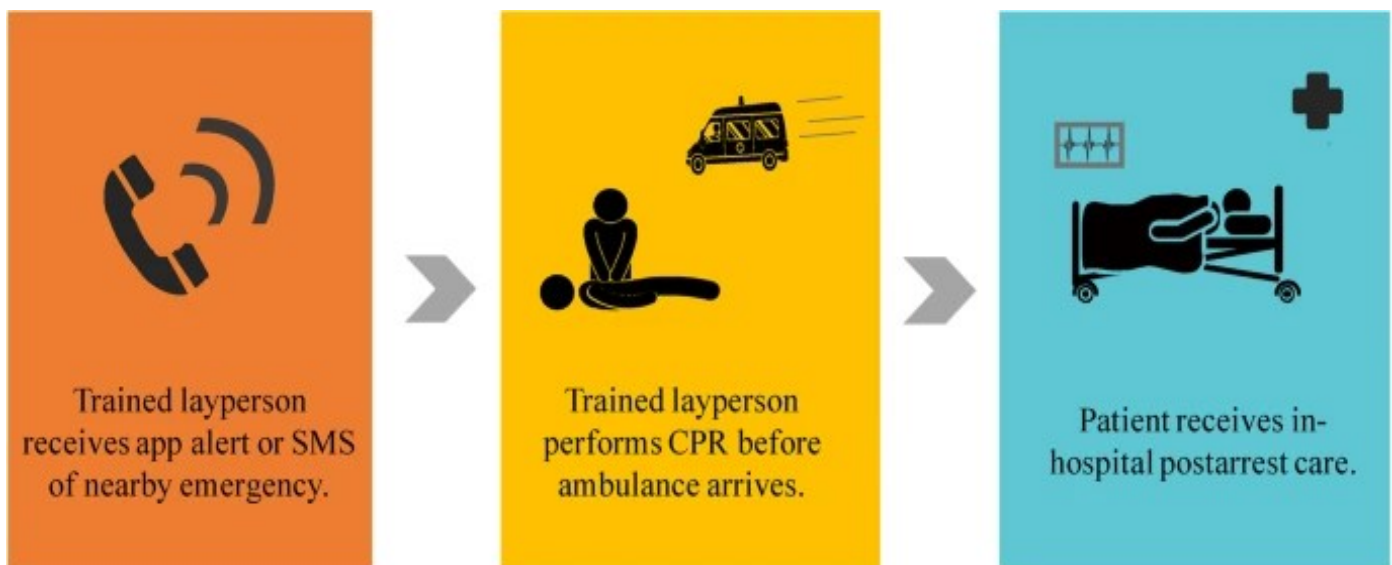
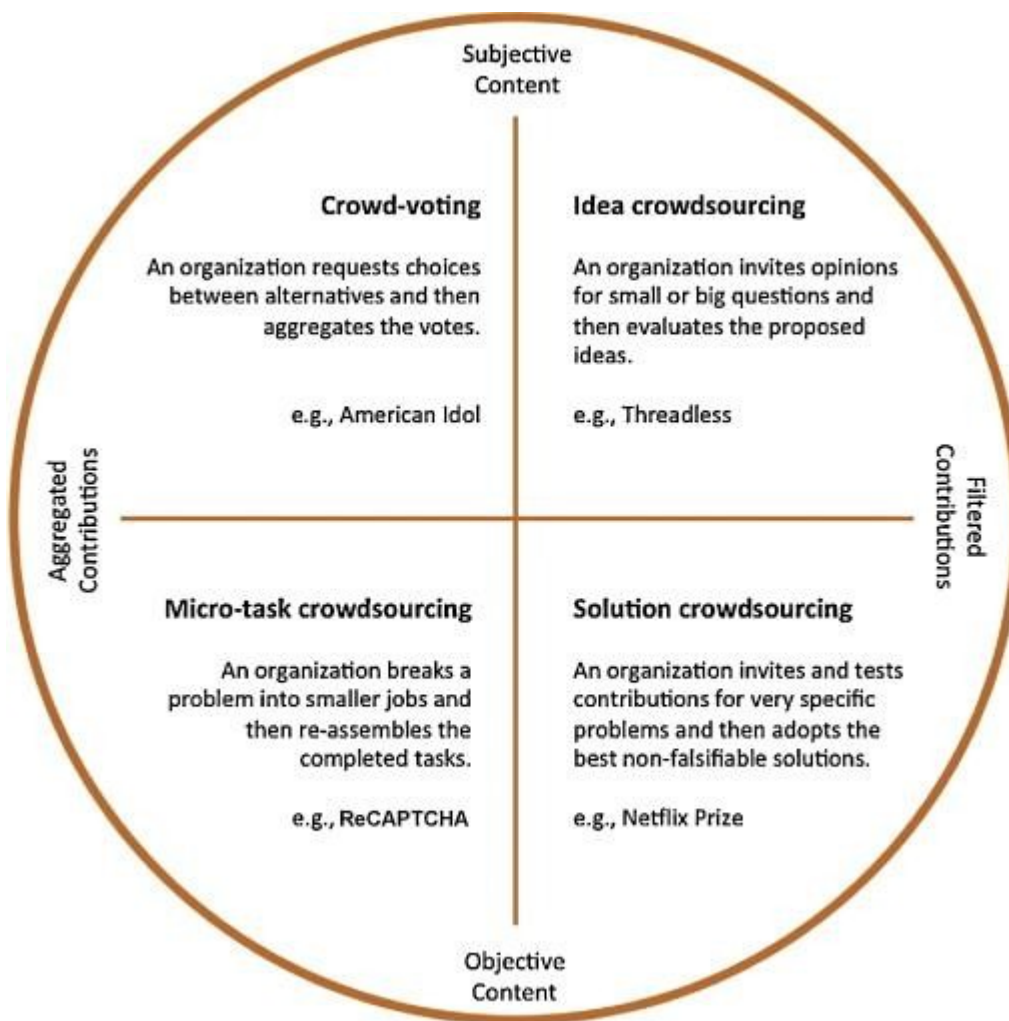


Fig3: Process of using crowdsourcing to facilitate layperson CPR outside of the hospital. CPR: Cardiopulmonary resuscitation; SMS: Short message service

Example2: We also found that crowdsourcing may be useful in the development of artificial intelligence projects. Four studies annotated medical data in order to train machine learning algorithms . Especially as crowdsourcing solicits input from large numbers of people, the resulting big data may provide a platform for machine learning. In addition, one open challenge was able to effectively develop a machine learning algorithm

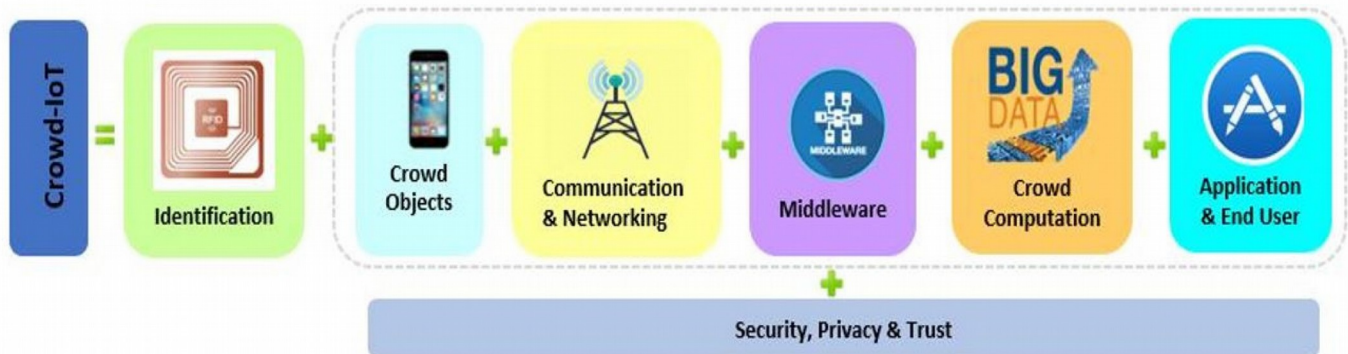




V. Future scope of the work

crowdsourcing can be an incredibly powerful driver of innovation for businesses that have an existing customer or fan base, but, like any tool, there should be an objective around what the company is looking to get out of it, and an expectation of how they'll measure the success of that campaign. Enabling collaboration from your community allows you to get directly prioritized feedback on what your potential customers actually want, and involving them in the process turns them from customer to advocate. Some campaigns, such as the Dunkin Donuts Create the Next Donut campaign have very successfully served as an engagement tool to allow people to talk about what donuts they like, while other campaigns, such as GE's Ecomagination challenge (for which my company Appswell provided the mobile platform for) are really looking at bubbling up complex ideas about clean energy, so crowdsourcing can be a very flexible tool, if you go into it with a clear objective. As brands continue to grow giant "fanbases", they're going to increasingly look to tap these valuable communities in engaging and useful ways, and I think we'll see this strong upward trend in crowdsourcing to continue.

There is a lot of creative space for businesses to apply principles of crowdsourcing to their pre-existing business models. Product development is a really interesting category to look at. Consider the site Quirky.com. They do crowdsourced product development and the result is a launched product that has been pre-validated and pre-bought by an early adopter community. Some companies such as Apple can innovate and design from within and kill it most of the time, but for other companies that are struggling to create a product consumers really desire, it seems like adopting a crowdsourcing model is one answer. You can imagine a smart phone maker posting a contest that allows designers to know the basic specs and general parts available for the phone, and then let the crowd compete to design the best version given what is available. Allow people to vote products through various rounds, and most importantly, reward the passionate followers with buying opportunities and perks to encourage them to spread their passion for the product they helped create. That is just one example of many that might apply. Whitla's (2009) early research on how crowdsourcing can be used as a marketing innovation pointed to three specific areas: advertising and promotion, product development and market research.



Concerning market research he highlighted two significant reasons why crowdsourcing market research was a good thing:

- 1) low-cost access to large numbers of people and consumers
- 2) possible access to quality information through access to experts.

Unwittingly, a good portion of market research already uses crowdsourcing.

Ironically, the most common form of crowdsourcing in market research is the simple collection of data using surveys (Zadeh & Sharda, 2014).

Rathi and Given (2010) suggested that we were moving to a new phase in research called Research 2.0. In this new era, researchers can use the collective power of the crowd through crowdsourcing techniques not only for data collection but also for data analysis and writing. In fact, we can even say that the use of crowdsourcing, “Collapse(s) the market research process into an instance of firm-consumer co-creation.” (Brabham, 2012, p.10). Further by utilizing the crowd and co-creation, researchers can achieve even greater insight (Rathi & Given, 2010) directly without the need for marketing or research agencies.

Crowdsourcing is the practice of obtaining needed services, ideas, or content by soliciting contributions from a large group of people. In the past, that sometimes meant a long, arduous process, hindered by the communication challenges one would expect to encounter at a time before the internet. In fact, not much attention was given to crowdsourcing before it was adopted by web-savvy organizations that were designed to take advantage of the networked world. This is the primary reason the term crowdsourcing was coined only a few years ago, despite the concept’s existence for quite some time now.



Just as the internet played a role in the evolution of the word, social media is transforming the way we think of crowdsourcing and will continue to do so as the benefits of using social media to crowdsource become more well-known. Social media is becoming an essential component to crowdsourcing as it allows organizations to reach a wider audience faster, cheaper and more efficiently than ever before.

Current crowdsourcing campaigns almost always use social media to obtain a higher number of contributions, in theory leading to a better quality idea, service or whatever the desired end-product might be. As social media monitoring technology becomes increasingly popular and sophisticated (currently, [one-third of marketers do not monitor social media](#)) more and more organizations will pay closer attention to how social media can be used to fuel their crowdsourcing campaigns.

Examples from crowdsourcing pioneers Threadless and Doritos illustrate how social media is providing organizations with the essential channels required to reach the masses and make their crowdsourcing efforts a success. They also show the importance of monitoring social media to fully understand its contribution to their organization's crowdsourcing effort.

The business implications of crowdsourcing in the future of work.

Many clients ask my opinion on the future of work and how technological advances such as artificial intelligence and machine learning may impact their people. This is not an easy question to answer. In my opinion, some jobs will become irrelevant, completely taken over by automation. Most jobs will continue to integrate technology in ways that make people more productive and where technology is capable of handling the more mundane and routine tasks, freeing people up to do what computers can't. This would include freeing people up to do things that computers can't like creativity.

In a world where the challenges we face become increasingly complex, finding methods of bringing together crowds, experts, and technology in ways that facilitate creative and beneficial solutions presents exciting opportunities where a great many "laypeople" can engage in activities that they enjoy while solving real-world challenges.

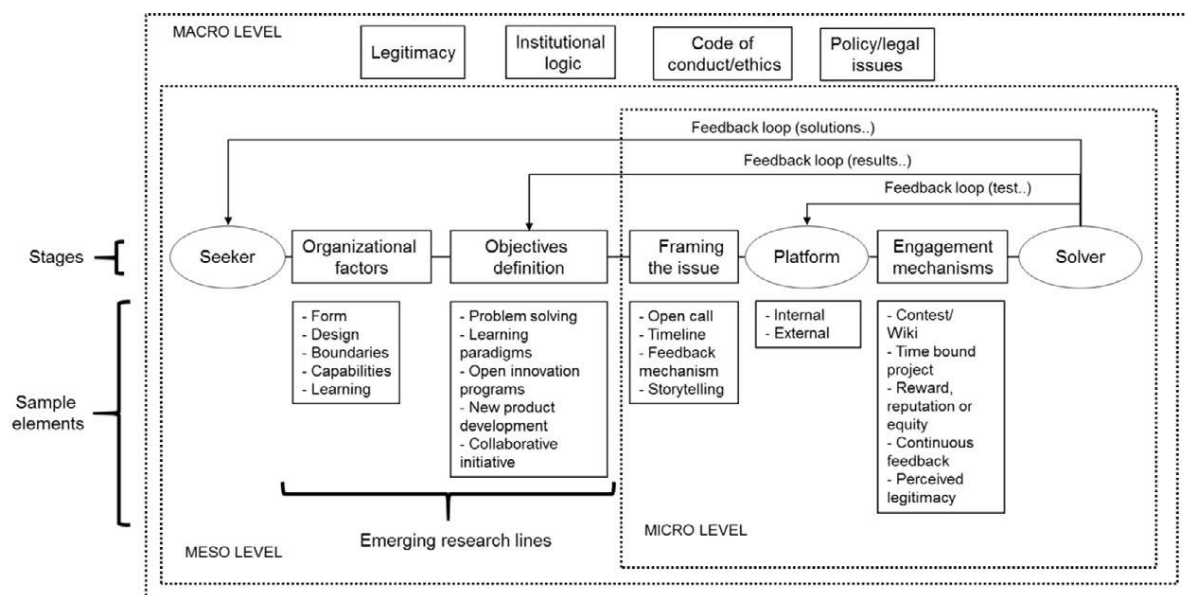
VI. Conclusion

Throughout of this thesis, it has been presented the growing importance of crowdsourcing as a new business process, as seen in the many examples available. At the academic level the amount of literature on this field produced in the last years has been numerous, with many authors providing the grounds for its explanation and definition.

The research and the analysis carried out have been able to introduce this field of the companies' activities and processes. It has also provided a broad overview of many models of crowdsourcing which has allowed to get a complete view of the process included, the players involved and the tasks carried out by each of them. Another area discussed has been the effect in organizations that this new business approach has provided and the needs that the new organizations surging in this field have, specially in the necessity to achieve a legitimacy for their actions and these type of activities.

Once both areas have been introduced, the work has centered on the development of the model that established a relationship among them. This was the main objective of the thesis.

The conclusion that could be drawn from those results was the existence of different components of the crowdsourcing processes, which represented areas of analysis of the organizations involved that allowed the development of the framework model that provided three level of analysis: micro or individual, meso or organizational and macro or societal levels.





The current research has achieved the following main goals:

- Identification and selection of dimensions from crowdsourcing models and taxonomies
- Identification of three organizational levels and of elements within them, for the analysis of the impact on organizations
- Development of an initial framework model of crowdsourcing processes and organizational levels
- Development of a detailed model that links the dimensions of crowdsourcing models and the elements of the organizational levels
- Validate the approach proposed by the model developed for the analysis of crowdsourcing initiatives

Crowdsourcing has been used to improve health in many settings. Although crowdsourcing is effective at improving behavioral outcomes, more research is needed to understand effects on clinical outcomes and costs. More research is needed on crowdsourcing as a tool to develop artificial intelligence systems in medicine.



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