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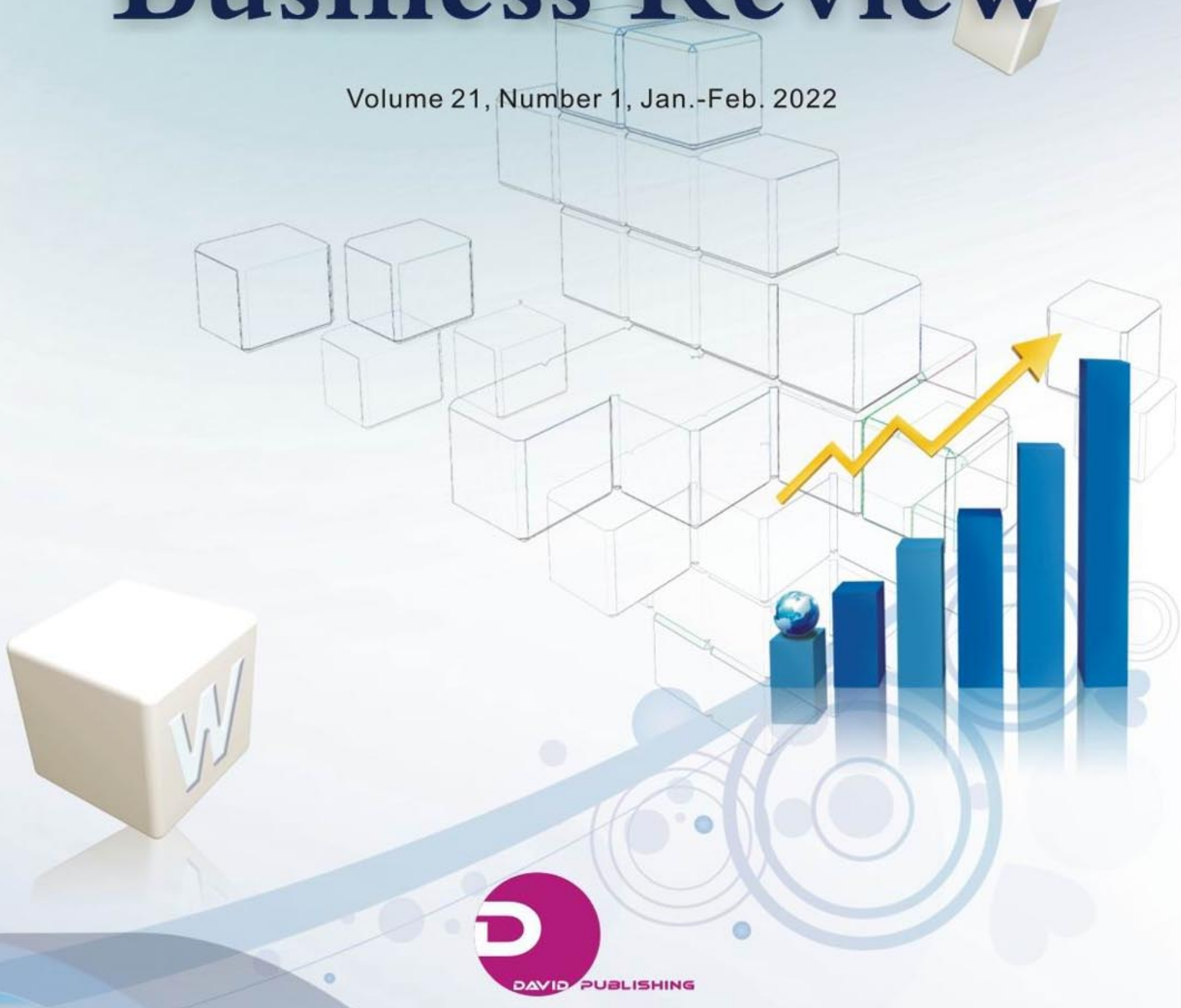

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Thinking Probabilistically Revisited

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Probability distributions are derived for real-world situations where the environment may be subject to high volatility involving radical revisions in probability judgments. A simple procedure is outlined deriving an initial probability distribution which may then be adjusted to reflect additional or new information. The trade-off between minimal computation and maximum information is examined.

Keywords: probability assessment, pairwise judgments, reciprocal matrices, eigenvalues, geometric means

Introduction

The very simple procedure as in Hughes (2020; 2021) is reviewed showing how to quantify beliefs about possible events or scenarios when initially only rudimentary or tentative ideas about the relative likelihoods have been formulated. As a first step the decision-maker (DM) orders the possible events from least to most likely. Then a series of pairwise judgments for typical events X and Y are made by the DM qualitatively with suggested associated quantitative values as follows:

- X and Y are equally likely (1.0);
- X is a little more likely than Y (1^{+}-1.25 or average 1.13^{+});
- X is not quite twice as likely as Y ($1.75\text{-}2^{-} < 2$ or average 1.88^{-});
- X is between two and three times more likely than Y (2.5).

Of course, quantifying qualitative ideas accurately takes practice. One way is to average a range of values as above. Say you believe X is a “little more” likely than Y. But should “little more” be 10% or 40% more likely? Using an X/Y ratio of (1.1 + 1.4)/2 or 1.25 will get you to the “ballpark”. Over time, exactly what a “little more” means to you can be refined more precisely.

Possibly values such as 1.15, 1.2, 1.25 etc. will seem more natural to the DM than say 1.13 as above. Whatever values are used by the DM, they may only be vague or rudimentary and the approximations as above may be useful. Pairwise judgments, however, are only a means to the end of a “ballpark” distribution and not fixed points to be adhered to.

Structuring Probability Assessments

To illustrate the methodology, take a situation with four events A, B, C, and D and allow this ordering to be from least to most likely in the DM’s view. Using the illustrative pairwise values above, the probabilities can be determined as in the following table, with A least likely (base value 1.0) and D most likely with the likelihood of D over C (D/C) judged to be 2.5.

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Table 1

Computation of the Probabilities From the Initial Pairwise Judgments

Event	Pairwise value	Compound value	Probability	Percent	ML % P(·)*
A	1.00	1.00	1.00/9.5654 = 0.105	10%	Base = 1.0
B	1.13	1.00 x 1.13 = 1.13	1.13/9.5654 = 0.118	12%	12/10 = 1.20
C	1.88	1.13 x 1.88 = 2.1244	2.1244/9.5654 = 0.222	22%	22/12 = 1.83
D	2.50	2.1244 x 2.50 = 5.311	5.311/9.5654 = 0.555	56%	56/22 = 2.55
Totals		9.5654	1.000	100%	

Note. * More likely values for percentage probabilities.

Compound values are easily determined as in Column 3 with the C/A value necessarily 2.1244 and the D/A value at 5.311 as dictated by the preceding pairwise values. Probabilities are then determined as in Column 4 and percentage probabilities follow. In Column 5 we show the "more likely" (ML) values based on the percentage probabilities. Differences from the initial pairwise values are not material to the analysis, unless substantially at variance with the DM's re-considered judgments. The initial pairwise judgments are only a means to the end of a "ballpark" distribution which can then be altered as illustrated below following Table 3.

Table 2

Probabilities Using the Principal Eigenvector Method

Event	Pairwise judgment	Perfectly consistent reciprocal matrix				Priorities or eigenvalues	Probabilities	Percent probabilities
		A	B	C	D			
A	1.00	1	1/1.13	1/2.1244	1/5.311	0.169039	0.105	10%
B	1.13	1.13	1	1/1.88	1/4.7	0.191014	0.118	12%
C	1.88	2.1244	1.88	1	1/2.5	0.359106	0.222	22%
D	2.50	5.311	4.7	2.5	1	0.897765	0.555	56%
Totals						1.616924	1.000	100%

Constructing a reciprocal matrix as in Table 2 (with appropriately consistent values for the non-adjacent pairwise values as in 1.88 x 2.5 = 4.7 for C/B · D/C = D/B) and using the principal eigenvector methodology as outlined in Saaty (2005), the same probabilities as in Table 1 are derived. Crawford (1987) outlined an alternative method for deriving probabilities (or priorities in analytic network/hierarchy process terminology) using the geometric mean. Typically, there are very small differences in the probabilities derived with either method. A modern review of both procedures (and others) is given by Brunelli (2015).

Pairwise Judgments on All Events

It is possible that construction of the perfectly consistent reciprocal matrix as in Table 2 triggers further judgments of the DM for the non-adjacent events. Specifically let us suppose that C/A becomes 2.0 (C's greater likelihood over A is now slightly reduced), D/A reduces to 4.0, and D/B reduces to 3.0 (D's predominance over A and B also now reduced). Again, it might seem more natural for a DM to use integers here or alternatively a value like 3.5 to reflect ajudgment of between three and four times more likely. Resulting probabilities using the eigenvector and geometric mean methodologies are shown in Table 3.

Note first that probabilities derived using either the principal eigenvector or geometric mean method are very close and identical when expressed in percentage terms. As foreshadowed by the re-considered judgments, the probability of D drops by 6% and the probabilities for all other events rise slightly. Re-consideration by the

DM may have resulted in a recognition that the probabilities of the less likely events A, B, and C were too small when considered as a group. That is, there was a 50% chance that one of them could occur. This illustrates one advantage of using all n(n-1)/2 judgments in a n-event problem as opposed to the minimal (n-1) judgments. Of course, the DM could have made these adjustments directly following the Table 1 results, although implications from the additional pairwise judgments may be useful before finalizing the distribution.

Table 3

Pairwise Judgments on All Events

Event	Reciprocal matrix				Priorities or eigenvalues	Geometric mean	Probabilities		
	A	B	C	D			Eig' values	Geo mean	Percent
A	1	1/1.13	1/2	1/4	0.209607	0.576711	0.1223	0.1229	12%
B	1.13	1	1/1.88	1/3	0.244354	0.669037	0.1425	0.1425	14%
C	2.0	1.88	1	1/2.5	0.404605	1.107419	0.2360	0.2360	24%
D	4.0	3.0	2.5	1	0.855950	2.340347	0.4992	0.4986	50%
Totals					1.714516	4.693514	1.0000	1.0000	100%

Further adjustments such as accounting for probability differences are also possible. When considering the distribution in Table 3, the DM may determine that event A is at most a 10% chance. This allows event B to be increased to a 15% chance with a 5% differential over A leaving C with a 10% differential over B with its increased probability to 25%. In this case, the probability of one of A, B, or C occurring remains at 50% and this could be an additional (non-pairwise) assessment of the DM. Judgments such as these on probability differences between events are now easier to make with an axiomatically correct distribution as the starting point.

Conclusions

As demonstrated above, pairwise judgments are not the only input into the DM's final distribution. And even for the pairwise judgments it could be assumed that a set of common factors pertains to each pairwise judgment in turn. In reality, it may be that a certain pairwise judgment highlights factors that may be missing (or of lesser effect) from the other pairwise judgments. Should this be of concern? Possibly not with the averaging process (either by the eigenvector method or geometric mean) over all pairwise judgments sufficing to incorporate all relevant factors appropriately at some point in determining the "ballpark" distribution. There is a tradeoff between the economy of method with the minimal number of judgments versus ensuring all factors are accounted for (if not to the same extent in every pairwise judgment) in determining the "ballpark" distribution. This could be an argument for requiring a complete reciprocal matrix initially.

In the real world of the Internet-of-Things, relevant information is arriving almost continuously and opinions about the likelihoods of various events in certain situations diverse, widely disseminated, and subject to volatility. The origin of the COVID-19 virus is but one example. This almost continuous arrival of information relevant to certain situations makes revision of probability calculations essential. Here the minimal (n-1) pairwise comparisons for a n-event problem seems optimal requiring least computation. On the other hand, since each pairwise judgment may incorporate factors unique to that particular assessment, n(n-1)/2 judgments over all events make use of all information and may therefore serve to make the initial "ballpark" distribution more "correct".

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The Company Clusters Power in Tourism Destinations: The Network Configuration and the Business Organisation

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Better and greater coordination and integration between companies are essential for tourist destination development processes improving competitiveness. Moreover, it is difficult to imagine that all companies can cooperate. In this way, we can imagine finding a group of companies that, for several reasons, decide to cooperate, creating some clusters as small groups. Companies with stable connections with other clusters or relevant companies could be relevant and central to Tourism Destination (TD) management. In this way, the knowledge of network articulation seems to be critical for TD management business dynamics. In most cases, the relationships are hidden and not formalised, increasing the complexity in TD analysis. The presence of clusters is possibly vitrificated using the Social Network Analysis (SNA) methodology. The present work could be framed in cooperative networks since it analyses the companies' commercial networks and clusters groups. The article focuses on how groupings of small firms can govern Tourism Destinations. This paper uses network indexes and metrics to emphasise structural features regarding the density and centrality of relationships. As the main result, in the case study analysed, there is a relational framework where three clusters of companies with a high density of exchanges emerge. These groups can influence the tourism business at the destination.

Keywords: Social Network Analysis, Tourism Destination (TD), family relationships, cooperation

Introduction

Tourism Destinations (TDs) are where the tourism industry is based (Leiper, 1990; Carlsen, 1999). The tourist production needs collaboration and cooperation among companies (Gunn, 1977; Bramwell & Lane, 2000; Jamal & Getz, 1995) since tourists perceive destination as a single and comprehensive experience (Buhalis, 2000; Haugland, Ness, Grønseth, & Aarstad, 2011; Van der Zee & Go, 2013). Better and greater coordination and integration between companies (Costa, Breda, Costa, & Miguéns, 2008; Lazzeretti & Petrillo, 2006) lead to greater satisfaction of the demand, essential for tourist destination development processes and improving system competitiveness. The network between companies reduces transaction costs and generates added value for the local business (Fuglsang & Eide, 2013; Tinsley & Lynch, 2001). A better-combining relationship between stakeholders' participation in the network can generate critical competitive advantages

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(Saxena, 2005; Sorensen, 2007; Halme, 2001; Trembley, 1998; Hall, 1999; Wray, 2009; Vanneste & Ryckaert, 2011). It seems clear that the increasing cooperation among local enterprises creates a solid operational network. Still, it is difficult to imagine all companies cooperating in a Tourism Destination (TD). It's acceptable from the companies both the need to cooperate and the cost of cooperation.

In this way, we can imagine finding a group of companies that, for several reasons, decide to cooperate, creating some clusters or small groups. Due to consistent and constant relations, enterprises that work together create groups or companies' clusters inside the destination network. Companies with stable connections with other clusters or relevant companies could be relevant and central to TD management.

In this way, the knowledge of network articulation seems to be critical for TD management business dynamics. In most cases, the relationships are hidden and not formalised, increasing the complexity in TD analysis.

The presence of clusters in the TD is possibly vitrificated using the Social Network Analysis (SNA) methodology. The present work could be framed in cooperative networks since it analyses the companies' commercial networks and clusters groups.

Theoretical Background: Destination Network

Walter Hunziker and Kurt Krapf (1942) defined tourism as: "… the sum of the phenomena and relationships arising from the travel and stay of non-residents, in so far as they do not lead to permanent residence and are not connected with any earning activity", looking at tourism as a global, complex, and organic phenomenon. In other words, the authors represent tourism as a dynamic and relational matrix, where the relationships and the interactions among the involved subjects, the resources, and the interests are essential to explain both the origin and the development of tourist activities, as well as its rise and its decline in different sites over all the world. This implies the need to find tools and methods that can study the destination, focusing on the existing relations between the other elements of the tourist destination (Baggio, 2008).

The presence or the absence of these relationships, both formalised and not, represents the network of a tourist destination (Tinsley & Lynch, 2001; Copp & Ivy, 2001; Halme, 2001). It analyses destinations by moving from the well-known hypothesis of strictly connected elements as destination mix (Leiper, 1990; Carlsen, 1999).

Networks in the tourism sector can be considered from different theoretical perspectives. The TD network could be viewed as a set of knots, individuals, and organisations (companies, institutions, third sector organisations, etc.) linked through specific social relationships (friendship, affairs, family, affinity, etc.). From this point of view, each tourist destination is a network of relationships between subjects belonging to the destination and representing, in the end, the local tourist system. So, the proliferation of studies focused on social networks in tourism is no surprise (Camprubí, Guia, & Comas, 2009; Bhat & Milne, 2008; Dregde, 2006; Novelli, Schmitz, & Spencer, 2006; Shih, 2006).

Hence, from a social network point of view, coordination, cooperation, and interaction between tourist operators are essential for genuine tourism development (and consolidation) at the destination. Local operators must work together in an integrated way because the competitiveness, based on an integrated supply of goods and services able to meet the demand, derives from this approach (Comas, 2005; Tinsley & Linch, 2001); this is the way to guarantee the proper functioning of the destination (Torraleja & Martos, 2003).

In the Tourism Destinations, it is expected that local opportunities are managed by and for local enterprises which are well acquainted with the existing local tourist resources (Torraleja & Martos, 2003). They are usually a local group of companies in a TD, representing a single network inside the destination (Ryan & Mottiar, 2007; Torraleja & Martos, 2003; Getz & Carlsen, 2005; Getz, Carlsen, & Morrison, 2005; Jaafar, Maideen, & Sukarno, 2010; Hallak, Assaker, & O'Connor, 2014; Zapalska & Brozik, 2014). Then, a cluster of business companies manage the business scene and influence the destination network. Perhaps, it depends on the prevalence of micro-enterprises and the peculiarity of their management.

This economic interaction is composed of individuals who, like the nodes of a relational grid, are responsible for establishing or maintaining the set of formal, informal, economic, and social ties underlying the operation of the entire tourist destination. Small tourist destinations are mainly characterised by a widespread presence of micro-businesses who need to cooperate. Then, cooperation is often a necessity and is encouraged by tourism policies aimed at growth and development (Carrà, Mariani, Radić, & Peri, 2016). However, it encounters resistance or driving forces in the relational configuration and relationships between companies.

Likewise, the operational limits of cluster management (Shaw & Allan, 1998; Shaw, 2014) can influence the destination management and the business dynamics inside a sector.

Methodology

The Social Network Analysis (SNA) is an interdisciplinary methodology developed in sociology suitable to represent relational networks in the economic field. The milestone works of Jamal and Getz (1995), Tremblay (1998), and Hall (1999) in the configuration of the network's theoretical *corpus* seem to be applicable in the tourism field (Baggio, Scott, & Cooper, 2013).

The application of this technique makes it possible to understand how a network is articulated through the study of the attributes of the players and the composition of the network (Afuah, 2013). The analysis of the differences in how players are connected is used to understand the characteristics of the players and their behaviour (Scott, 2017). Multiple ties imply that people can more easily share the rules that favour economic networking until conformity with values and institutional practices is achieved (Powell, DiMaggio, & Chiesara, 2001; Meyer & Scott, 1992).

The multidisciplinary origin of the SNA has led to the creation of a wide range of quantitative measurements which allow the identification of the main features of the network (Scott, 2000).

The indexes used are:

Table 1

The Social Network Analysis Indexes

Index	Formula	Description
Density	$\frac{A}{\frac{b(b-1)}{2}}$	This index varies from 0 to 1, 1 being the density of a graph in which all the companies are interconnected. A is the number of lines; b is the number of companies in the network.
Clustering coefficient	$Ci = \frac{2l_i}{k_i(k_i-1)}$	Calculated as the ratio between the actual number l_i of links connecting the neighbourhood (the nodes immediately connected to a chosen node) of a node and the maximum possible number of links in that neighbourhood.
Structural holes	Constraint = $x_{ji} + \sum x_{iq} * x_{jq} q \neq i,j$	Calculate the separation of different actors who are not connected and the absence of ties between two networks. This variable is obtained by subtracting 1—Constraint.

Table 1 to be continued

Centrality	$\lambda v = Av$	This measure of centrality captures the critical feature that an ego's status and power in a network function of how many alter they are tied to and how high in centrality (and consequent status and power) each of these changes is. A high value is given to an actor connected to many actors who are also well-connected, where: A is the graph's adjacency matrix; λ is a constant (the eigenvalue); v is the eigenvector.
Geodesic distance	$g_{ij}(t_k)$	Geodesic distance from i to j for actor k. It calculates the length of the shortest path connecting two points.
The average distance	$\frac{g_{ij}(t_k)}{n}$	It is the average of geodesic distances.
Betweenness centrality	$BC(t_i) = \sum_{i<j} g_{ij}(t_k)/g_{ij}$	Views a node as being in a favoured position to the extent that the actor falls on the geodesic paths between other pairs of actors in the network.
Standardized betweenness centrality	$N\ BC(t_i) = BC(t_i)/[(g-1)(g-2)/2]$	The indicator $BC(t_i)$ can be standardized by dividing it by the number of pairs of actors not including t_k.

Each player could facilitate or constrain business actions (Granovetter, 1973; Kogut, 2000). If the density of the relationship at a destination increases, communication becomes more efficient (Rowley, 1997), encouraging conformity and inclusion and allowing the cohesion of a goal (Pavlovich, 2003). Instead, a low-density network internally develops a few small core elites with strongly interconnected players.

Research Hypothesis

To explore the underlying reasons for this example of excellent tourism success, that is, San Vito Lo Capo in Italy, the essential question to be addressed by research should be: How is the structure of the network relations within the TD?

As previously highlighted, cooperative dynamics and, in general, a relational approach among the local actors lead to the development of a virtuous network aiming at the economic and professional growth of all the participants with a positive impact on the destination. This cooperation also leads to an improvement of the specialisation reducing the unprofessionalism which too often characterises this sector (Getz et al., 2005; Shaw & Allan, 1998; Shaw, 2014) and determines a low quality in the services provided.

The aim is to verify the existence of any form of cooperation among local enterprises and to identify a potential general framework that could be considered a model to apply for TD analysis. This one should be regarded as a pattern for reaching the right degree of cooperation among the local operators and supporting long term development.

The analysis moves from the two following research hypotheses:

H_1: In the TD, the network among companies exists and is driven by a small number of leading enterprises.

H_2: Company clusters working together exist and have a central role in the relational context of TD.

Data Collection and Analysis

The research analysis unit is the town of San Vito Lo Capo (*N*), an emerging coastal TD, where networks are particularly critical and complex due to the role of small business companies.

Tourism in this destination has grown to the point that overnight stays have risen from 134,507 in 1996 to 536,856 in 2018. A substantial increase has matched the demand for beds offered in private homes and rental

housing. The dimensions of San Vito Lo Capo houses in 2018 used to accommodate tourists are—officially—82 able to offer 952 beds. A considerable number of families inhabit this small TD.

The network actors were given a questionnaire in which they asked, among other things, to answer questions referring to the relational situation.

Table 2

The Survey Questions

Company information	Network questions
Name of owner	With which of the following enterprises do you have commercial relationships, during the year, to realise the tourist services provided to your customers (overnights, transfer, excursions, food and beverage, suggestion/advice for other structures, entertainment services…)?
Gender	
Age	With the owners of the following enterprises, do you have a strong or constant/familiar relation?
Study levels	
Participation in trade associations	

While recognising the existence of different links between the local and external enterprises, we focused only on the relationships between local enterprises. From the Reference Collective (N), consisting of 94 companies, 71 units responded, 15 operators expressed the desire not to cooperate, seven were not traced, and one company was not operational. The analysis of the relations was performed using Ucinet 6 software (Borgatti, Everett, & Freeman, 2002).

Table 3

The Survey Company

Code	Activities	Company
TRA	Car and bus transport and taxi service	1
	Car, scooter, and bike rentals	1
HAC	Hotels and similar	26
RIS	Resorts	1
AAC	Guest houses for short stays, holiday homes and apartments, B and Bs, residences, accommodation connected to farms	18
	Camping areas and areas equipped for campers and caravans	4
RES	Restaurants	15
ADV	Travel agents and tour operator	3
OTH	Other activities	2

Calculating the SNA index, the density of the commercial network among the enterprises gives a value of 0.1403 in a range between 0 and 1, indicating that the commercial bond is weak. In other words, it can be said that it comprises 14.03% of all possible commercial ties. There is a non-cooperative environment; it is more likely that some enterprises will have opportunistic behaviours.

Results show that 66.25% of companies have some individual and familiar links. Each company has about two links, and at least one is a node of relationships. To verify the existence of a group of companies, the application of the structural holes index[1] analyses this network's characteristics. The network branches originate from some clusters presenting much denser relationships between some companies (see Figure 1). We can highlight three company clusters that are variously composed according to the activity carried out. In this

[1] Six, three couples of companies are disconnected from the family relational network, and four companies are independent family units.

way, we identified three clusters showing a high-density value equal to 0.50 (Company Cluster 1), 0.57 (Company Cluster 2), and 0.6 (Company Cluster 3).

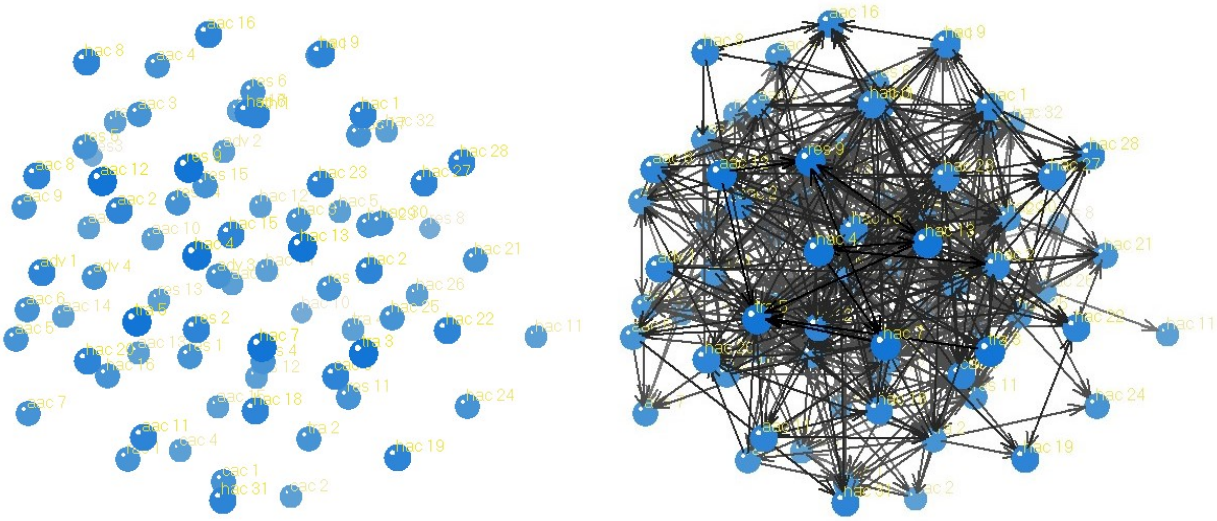

Figure 1. The Tourist Destination network density.

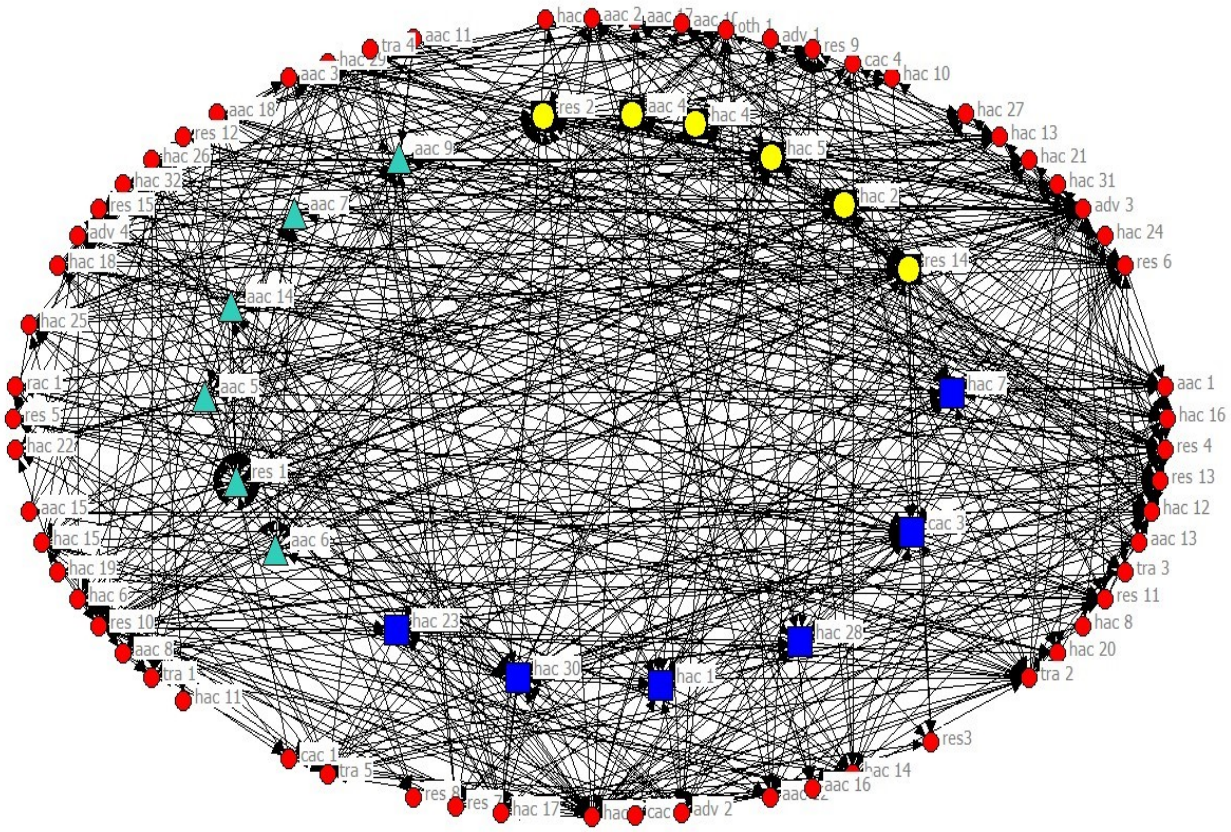

Figure 2. Companies network clusters.

As can be seen from Figure 2, Company Cluster 1 is the largest, is made up of eight members (six of them carry out an activity that is part of the category “Hotels and similar establishments”; 1 of them carries out a

move that is part of "Restaurants with service"; 1 member carries out an activity that is part of "Camping grounds and areas for campers and trailers").

Company Cluster 2 is made up of seven members (three of them carry out an activity that is part of the category "Hotels and similar establishments"; three of them carry out a move that is part of "Room rentals for short stays, vacation homes and apartments, B&B, apartments, housing connected to farms"; one member carries out an activity that is part of "Restaurants with service").

Finally, the Company Cluster 3 is made up of five members (three of them carry out an activity that is part of "Room rentals for short stays, vacation homes and apartments, B&B, apartments, housing connected to farms"; one member carries out an activity that is part of "Restaurants with service"; one of them carries out a move that is part of the category "Hotels and similar establishments").

The analysis of the subgroups of the commercial network allows us to discover that three clusters with a high internal density exist (equal to 0.80). Calculating the 1st-order neighbourhood for the three company clusters, we noted that these could affect 92.5% of the existing enterprises at the Tourist Destination. If we consider that the density of the commercial network is equal to 0.1403, we realise that the three company clusters can be relevant to managing and influencing the TD network.

Using the Bonacich (1972) centrality index, it is evident that the first two clusters have a considerable status and power within the TD network. This high value is given by an actor connected to many actors who are also well-connected.

Table 4

Bonacich Centrality

Companies' clusters	Bonacich centrality
Company Cluster 1	45.000
Company Cluster 2	41.000
Company Cluster 3	25.000

Source: Extracted from the centrality result in the appendix.

The data on the three company clusters are interesting compared to the other Social Network Analysis indicators. This index allows us to understand how a cluster company plays an essential role in commercial relations and how to manage it.

We can analyse this by calculating the betweenness centrality. The first two clusters use their power and status within the commercial network, placing themselves as vertices of relationships. Indeed, the high values recorded for the first two clusters indicate that they influence the network.

Table 5

Betweenness Centrality

Companies' clusters	Betweenness	N betweenness
Company Cluster 1	300.770	18.195
Company Cluster 2	221.821	13.419
Company Cluster 3	48.489	2.933

Source: Extracted from the centrality result in the appendix.

The data show that this structure provides a system of mutual assistance and exchange of commercial relations extended to all the players even if these did not fall within the kinship sphere.

The existence of three central clusters at the TD able to affect almost the entire system implies that, within the network, the enterprises share rules endogenously produced. This behaviour holds out to maintain stability for a long time (Hayek, 1973). Based on the mutual trust deriving from the cluster relationships, these cultural rules bring to compliance and set the interactions between the individuals (Bernheim, 1994).

Discussion and Conclusions

Local tourism production necessarily implies cooperation among the existing operators (Czernek, 2013; Baggio, 2011; Beritelli, 2011). In this sense, a tourist destination becomes a place of relationships and interactions between firms or businesses, originating from economic, social, and production relations (Dredge, 2014).

The results imply suggestions for practice and research since they demonstrate the contribution of network analysis to understand the structure and cohesiveness of a destination (Provan & Kenis, 2008; Michael, 2007; Morrison, Lynch, & Johns, 2004; Novelli et al., 2006) as well as the role of cooperation for local development (Albrect, 2013). Indeed, as previously highlighted in the international literature review, the relational approach improves the competitiveness and the performances of each actor of the system and that of the destination overall.

As an analytical tool, the company's network is instrumental. It considers the destination approach and the different actors operating in the area, pointing out a systemic vision of the destination. Moreover, the business network knowledge offers a good advantage for analysts because it allows highlighting the main features of the structure of the destination, capturing the potential weaknesses that can be addressed by policy and management approaches. Indeed, the visualisation of the relationships and structural positions of the local stakeholders is beneficial since the local structure of the supply can be easily interpreted by managers and shared with the destination stakeholders.

Starting from the hypothesis that the local tourism expansion derives from the cooperation between local firms, mainly small-sized family businesses, the case study investigates the existence and the intensity of such relations among local operators.

The results highlight company clusters as groups linked. The analysis of the characteristics of this network highlights that three clusters show a high-density value. Moreover, a deeper analysis of the sub-structures of the commercial network allows discovering that there are three clusters with a high internal density. Moreover, the three clusters can affect 92.5% of the existing enterprises at the tourist destination. Notably, Clusters 1 and 2 have multiple statuses and power within the commercial network.

The importance of these companies' clusters is demonstrated by regular collaboration with the others and their central role in trade relations with all enterprises at the destination. The presence of kinship links is the basis of the commercial relations of the three high-density clusters. These relations provide a system of mutual assistance and commercial exchanges. The enterprises involved in the network share rules endogenously and spontaneously produced in the network, based on the mutual trust deriving from the family relationships, aiming to maintain stability over time (Hayek, 1973; Bernheim, 1994).

These relations, again, determine the creation of social capital through which local enterprises measure up with each other, cooperating in the development of the whole local tourism system.

This type of cooperation, repeated over time, consolidates trust among the actors. The prominent companies can work the goal and affect its performance. Communication intensity reinforced through multiple

rounds of cooperation and the effectiveness of establishing contact (in line with transaction cost economics) also fosters collaboration. Hence, planners must develop bonds of trust among actors based on intense communication to increase the cooperation or launch collective action, considered a fundamental condition in an exploratory study (Saxena, 2005).

Finally, this work can be of interest for peripheral tourist destinations in territories characterised by local development difficulties or in areas characterised by structural under development. Namely, small, and micro-businesses and their kinship networks play a relevant role in creating and configuring new or more efficient tourist destinations.

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A New Approach to Probability Assessment

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Using spreadsheets and ranges for pairwise judgments, candidate probability distributions are generated for the decision-maker to consider. This replaces event-by-event determination of probabilities. Basic statistics of the distributions are then used to determine a final distribution for decision purposes as in buy, sell, or hold.

Keywords: probability assessment, pairwise judgments, spreadsheet analysis, statistical measures

Introduction

Modern computers and software such as spreadsheets have facilitated new approaches to probability assessment. In this short review, a methodology is outlined whereby the decision-maker (DM) uses pairwise assessments of possible events to generate resulting axiomatically correct probability distributions. These distributions comprise the "ballpark" within which the DM determines a final distribution possibly using other information. This replaces the current event-by-event determination of probabilities which may need repeated reassessment before probability axioms are satisfied.

Typically, real-world problems involve a modest number of discrete events such as a small price, quantity etc., change (±), a large change (±), or no change—a total of five events in this case. First the events are ordered from least to most likely; then "more likely" judgments are made by the DM with 1.0 denoting equally likely, 1.25 a little "more likely", 2 for twice as likely and so on. Suggested pairwise values are discussed more fully in Hughes (2020). These "more likely" judgments are the basic primary inputs that determine the resulting probability distribution of the DM.

Illustrative Example

The procedures are most easily explained via an example. To illustrate, we take four possible events A, B, C, and D arranged in order of increasing likelihood. The DM assesses the relative likelihoods as summarized in Table 1.

Table 1
Possible Pairwise Values for the Four Events

	Pairwise values	
Event	Low	High
A (Base 1)	1.00	1.00
B/A	2.00	3.00
C/B	1.50	2.00
D/C	1.25	1.80

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Table 1 shows the B/A likelihood ratio to be between two and three times "more likely" for the favored B event. The D/C value shows D is judged to be between 25% and 80% "more likely" than C.

All subsequent calculations emanate from the six "more likely" values in Table 1. Equally likely events would use 1.0 in both columns. The "more likely" ranges for the events determine 2^3 (more generally $2^{(n-1)}$ for n events) or eight possible distributions using appropriate combinations of the "more likely" values. Pairwise assessment (based on much experience) is outlined in Saaty (2008), with the B/A value ultimately determining the numerical priority (in Saaty's terminology) that B has over A. Priorities become probabilities here. Table 2 summarizes the calculations needed to determine the probability distribution for the Low column in Table 1.

Table 2

Probability Distribution Determination From Pairwise Judgments

Event	Pairwise value	Compound likelihood	Probability
A	1.00	Base 1.00	1.00/9.75 = 0.1026
B	2.00	1.00 x 2.00 = 2.00	2.00/9.75 = 0.2051
C	1.50	2.00 x 1.50 = 3.00	3.00/9.75 = 0.3077
D	1.25	3.00 x 1.25 = 3.75	3.75/9.75 = 0.3846
Totals		9.75	1.0000

Note that the D/A pairwise value calculated as (B/A)(C/B)(D/C) is 3.75. If the DM wished to directly estimate the D/A value (and other non-adjacent event pairwise judgments), this can be accommodated in the Saaty methodology but involves the use of eigenvectors, geometric means, or other averaging techniques to determine the final distribution. A modern summary of possible averaging alternatives is outlined in Brunelli (2015). Some examples using these techniques are presented in Hughes (2022).

All combinations of the pairwise values lead to eight possible distributions as shown in Table 3 and are routinely calculated in a spreadsheet. The Table 2 probabilities are Distribution 1 in Table 3.

Table 3

Resulting Probability Distributions Over Events A, B, C, and D From the Pairwise Values in Table 1

Event	Candidate probability distributions from initial pairwise judgments							
	1	2	3	4	5	6	7	8
A	0.1026	0.0877	0.0833	0.0704	0.0708	0.0602	0.0571	0.0481
B	0.2051	0.1754	0.1667	0.1409	0.2124	0.1807	0.1714	0.1442
C	0.3077	0.2632	0.3333	0.2817	0.3186	0.2711	0.3429	0.2885
D	0.3846	0.4737	0.4167	0.5070	0.3982	0.4880	0.4286	0.5192
Sum	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Distribution 8 in Table 3 uses the pairwise values in the High column of Table 1. Candidate probability distributions in Table 3 constitute the "ballpark" with statistical analysis in Table 4 using standard mean, median, and range measures. The DM can then input his/her final judgments in the Percent column for decision purposes. Currently, Table 4 shows the rounded Average probability as Percent.

Table 4

Statistics on the Candidate Probability Distributions in Table 3 for Events A, B, C, and D

	Probabilities		Range statistics				Probabilities		More likely value
Event	Mean	Median	Low	High	Midpoint	Spread	Average	Percent	
A	0.0725	0.0706	0.0481	0.1026	0.0753	0.0545	0.0728	7	Base = 1.00
B	0.1746	0.1734	0.1409	0.2124	0.1766	0.0715	0.1749	18	18/7 = 2.57
C	0.3009	0.2981	0.2632	0.3429	0.3030	0.0797	0.3006	30	30/18 = 1.67
D	0.4520	0.4511	0.3846	0.5192	0.4519	0.1346	0.4517	45	45/30 = 1.50
Sum	1.0000	0.9932	0.8368	1.1771	1.0068	0.3403	1.0000	100	
				Average spread = 0.0851					

The values under Average in Table 4 are an average of the Mean, Median, and Midpoint values. The last column in Table 4 shows the "more likely" values based on the DM's percentage probabilities in the preceding column. So, the final D/C value at 1.5 here is within the required range as in Table 1 of 1.25-1.80 for this pairwise value. The original pairwise values used as in Table 1, however, are not set in stone. They may only be tentative or vague and the DM's thinking may evolve during the investigation with the resulting pairwise values for the final distribution outside the ranges of the initial inputs as in Table 1. Of course, with the ease of spreadsheet calculation, revised pairwise value ranges can be employed at any time with resulting candidate distributions and statistics routinely re-calculated.

Note that the Mean, Median, and Range Midpoint values in Table 4 are all closely aligned for each event differing by at most 1%. It may be that, based on other judgments (e.g., one of A, B, or C has a 50% chance), the DM (after some reflection) may use a distribution closer to number 8 in Table 3. For example, 5%, 15%, 30%, and 50%, with pairwise values 1, 3, 2, and 1.67. Probabilities could then be validated (or re-calculated) using these (or similar) "more likely" values.

Conclusions

The above procedures are not demanding of the DM (initial pairwise ranges) and produce axiomatically correct probability distributions for the DM's consideration. Comparing distributions may be easier than event-by-event calculations. Modern problems confronting DMs (e.g., the origin of COVID-19) are not so clear-cut as drug trials or polls of constituents where relative frequencies on clearly defined outcomes are readily available. Typically, in the real-world situations experienced today, nuanced judgments are required and, even if such judgments are not precise, they can be managed as in the preceding analysis.

The probability of an outcome or event is in the mind of the DM. Unlike relative frequencies, the degree of belief on the likelihood of a given outcome is peculiar to that DM. By quantifying qualitative beliefs, the DM succinctly summarizes by way of probability a path to making a decision as in buy, sell or hold.

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Crowdsourcing for Innovation and the Conduciveness of University Students—A University Case: Altinbas University

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Although the concept of innovation takes place in the list of what needs to be done in the institutions, it has started to get old and insufficient as everything getting old in time. Particularly, the lack of resources and the existence of a large number of competitors have led institutions and scientists to go one step further. The concept of open innovation has paved the way for the process of integration of innovation that occurs within the institution with the external sources. While searching for a variety of tools to use the concept of open innovation in the best and the most efficient manner, the method of crowdsourcing has stepped forward. This method is to benefit from the experience and intelligence of the crowd which is the most important factor. The purpose of this study is to introduce the concept of crowdsourcing in details and to prove that university students are a suitable type of crowd for this method.

Keywords: innovation, open innovation, crowdsourcing

Introduction

Innovation continues to be one of the most popular and the most ambiguous concepts of recent times. While the necessity of innovation has been considered by all states and sectors, the best ways of innovating are constantly being explored by scientists. Innovation, in its simplest form, has been defined as transforming new ideas into the economy. However, as time progresses and technology advances, traditional innovation is no longer enough and new initiatives have been started to be tested. Scientists have been pegging away at moving innovation to a more advanced level. The purpose of this study is to determine the way innovation has progressed while defining it. The transition from innovation to open innovation, and finally to the crowdsourcing, has been narrated; a university student population from Turkey has been taken as the sample; the availability of the university student population for crowdsourcing has been investigated through the survey. Being conducted at a single university can be viewed as the limitation of the study.

Literature Review

The Concept of Innovation

The word innovation comes from the word “innovare” in Latin which means “renew, do something new, make a change”. Although the word “innovation” is in common usage, it has been used a lot in many articles. Definitions differ in various ways (Narayanan, 2001, pp. 1-3).

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Innovation has also been defined as transforming new ideas into the economy. A simple formulation of innovation was made in the following way: Innovation = theoretical concepts + technical innovation + commercial application.

Table 1

Definitions of Innovation

Author	Definition
Oslo Manual (2005)	"The realisation of new or significantly improved product (goods or services) or process, a new marketing method, or a new organizational method in business practices, in a workplace organisation or in external relations".
Peter Drucker (1998)	"Innovation is a tool for the entrepreneur to create new wealth-producing resources or to increase the wealth-producing potential of the existing resources".
Tidd & Bessant (2005)	"The process that ideas are transformed into useful and used new products, processes and services".

Schumpeter has divided the process of a product which would enter the market into three phases including invention, innovation, and diffusion (Smith, 1998, pp. 1-3): invention: the process of discovery of a new technical discipline conducted by the scientists; innovation: the process of commercialisation of an invention carried out by the entrepreneur; diffusion: the spread of innovation in the commercial use.

Today, concept of innovation reflects the entirety of three-stage process which Schumpeter referred to. According to Schumpeter, opening new markets, the presence of new production sources, Taylorism of the study, developments in the style of processing of materials, the use of new business management and organization models, briefly "things to be done differently" points to technological developments in the production of the goods and this development is covered by the concept of innovation.

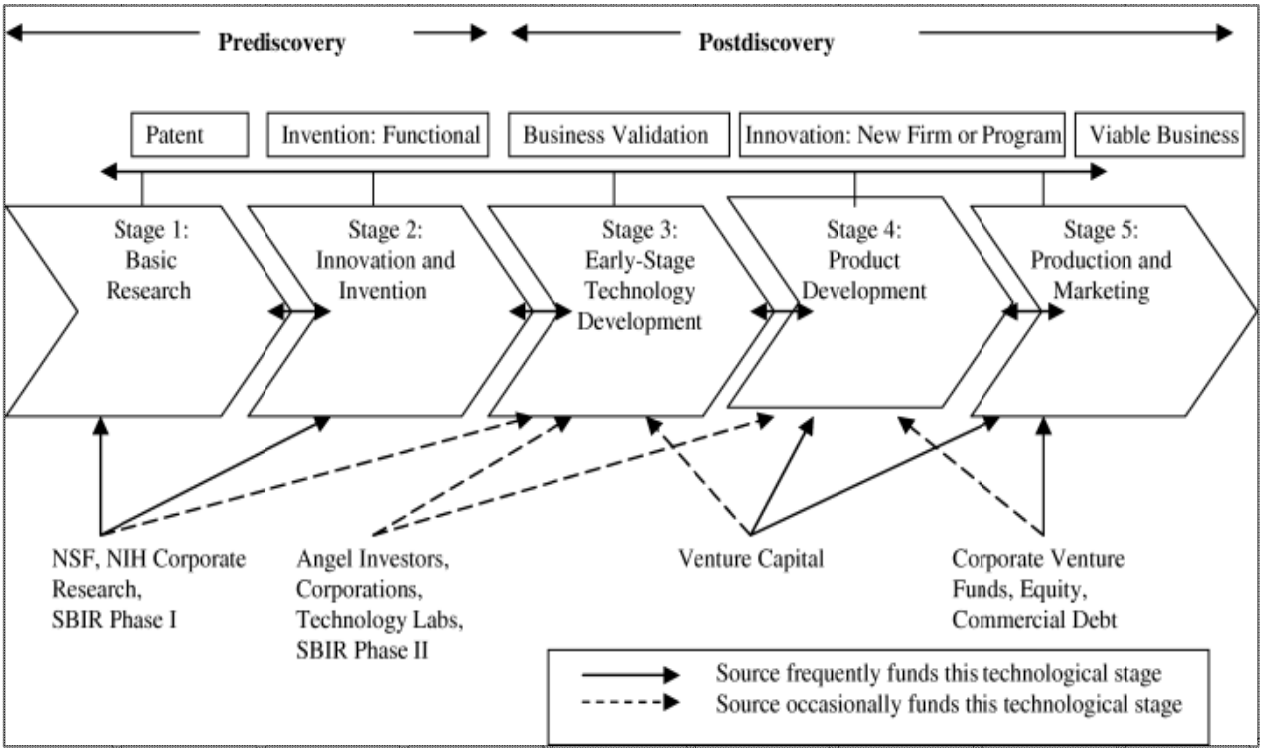

Figure 1. The sequential model of innovation and commercialisation. Source: Khilji, Mroczkowski, & Bernstein, 2006.

Khilji, Mroczkowski, and Bernstein (2006) have put the process of innovation and its commercialisation in a figure as above. Figure 1 illustrates how commercial competence becomes valuable and how it rules the stages after invention—that is to say, when an invention becomes available. Resources and activities should then be steered in the direction of the commercialisation of new products to build a proper business and make a profit. Talking about business innovation had started when Professor Clayton Christensen steered the businesses to follow the path of destructive innovation or sustainable innovation in order to achieve business growth at the end of the 1990s. While in a hurry to innovate, organisations have followed the path of open innovation or crowdsourcing which has been being still talked about by communities. In the previous trends of innovation, there have been methods for or methodologies for managing the development of new products along with original problem-solving methods. None of these methodologies were adapted to the internet age, nor were replicated for the mass innovation needed in the information age. Because most of the leaders have been unaware of the traditional (usual) innovation and the new methods have not been optimized, there is a need for a model for a systematically improved system to bring the change into the corporate culture and to make it ready for innovation and for collective adaptation to the information-saturated age of information (Gupta, 2011, p. 144).

Open Innovation

Innovation is vitally important that more and more regarded as a phenomenon worthy of social and economic research. Companies are concerned about their ability about the innovation, especially their abilities related to their competitors, because they think that their future might depend on it (Howe, 2006, p. 2).

However, the innovation process in many companies makes cough sound like a rusty old engine. Just as the internal combustion engine, because the parameters have changed completely, traditional innovation's time also is about to up (Prahalad & Mashelkar, 2010, pp. 1-3). As communication facilities and technological opportunities increase, the level of competition of the companies has also been increasing. The increasing level of competition persuades firms to differentiate the products, and this situation brings the pros of the R & D costs. The increase in the cost of production which information that is required for development within the enterprise will generate requires the flow of information from the outside. In innovation, provision of information from internal and external sources by moving beyond the traditional business association has a significant role in increasing the innovative capacity of the firm (Linton & Walsh, 2004, p. 522).

Innovation efforts may be enough in a market environment where uncertainty and variability are limited. However, if there is uncertainty and variability, if the firm enters a stranger market, or if a stranger product starts to be produced, you will need to show more effort to see the opportunities and threats before us (Chesbrough, 2004, p. 25). The increase of uncertainty and volatility in the market with the need for information forces businesses to move beyond the concept of innovation and makes internal R & D activities insufficient. This has led to the emergence of the concept of open innovation by moving beyond innovation. Open innovation is the provision of valuable information in and out of the business in order to accelerate internal innovation and is to make markets use innovation as exogenous (Chesbrough, 2006, pp. 1-3). In fact, open innovation is often defined as the use of external markets and is considered as its equivalent (Felin & Zenger, 2014).

According to Chesbrough and his friends, the array of the values of open innovation can be considered as the antithesis of the traditional vertical integration model where the firm develops inner products with internal

R & D activities, and then these products are distributed by the company. Open innovation is the range of values assumes that firms can use and should use external ideas as well as internal ideas and internal and external market paths while attaching importance to advancing the technologies of firms. While the business model states that endogenous mechanisms demand a portion of the value created, gains favour with creating value from both external and internal ideas. At the same time, open innovation assumes that the inner ideas can be marketed through external channels beside the firm's existing businesses to create added value (Chesbrough, Vanhaverbeke, & West, 2008, pp. 1-3). In terms of the shape and the time of the emergence of new solutions, the relationship between the compatibility of the external resources and things a company can do coming to end with innovation practices in the literature of innovation has come a long way (Faludi, 2014, p. 35). The scientists who deal with open innovation have focused on the need of focal organisations to go beyond the boundaries by providing information from the outside Felin and Zenger (2014), who have contended that environmental uncertainty and the complexity of the reunification of innovation and knowledge lead to the increase in the permeability of organizational boundaries and lead to the need of organisations to interact with their environment and external stakeholders in more ways. The concept of open innovation covers a wide range includingexternal actors, users, customers, suppliers, competitors, and universities. Underlie mechanisms of encouraging access to external information and open innovation coverseveral alternatives including respectively, the competitions and tournaments, alliances and partnerships, corporate venture capital, licensing, open source platforms, and various development communities (Walter, 2014, pp. 1-3).

The Concept and the Scope of Crowdsourcing

In the past decades, the world has experienced technological and social changes where information has spread much faster. Mankind today is faced with several daunting challenges, demanding drastic solutions: climate change, global pandemics, failing states, drug crimes, terrorism, the expansion of nuclear power, the destruction of nature. We need to find novel innovation systems in order to cope with these challenges. We must learn how to fix multi-faceted and controversial issues. In the early 20th century, Thomas Edison and General Electric have created the modern R & D lab and a series of protocols which will help to produce a technological progress which has been imitated very much, covering a century in a value. Today, mankind's most poignant problems are not technological in nature; in social, cultural, and political nature and in a global dimension. Therefore, we need to innovate steadily as Edison did. Luckily, there are new meta-innovations such as idea markets, crowdsourcingm and folksonomy that allow us to innovate between disciplines, boundaries, institutions, and ideologies (Hamel, 2014, pp. 1-3).

The creation of outsourcing processes and company networks become useless considering the new age in organisational field. In the new framework, the use of mechanisms such as crowdsourcing defined as getting the external source from the crowd and what we have defined as the capabilities of the mass related to the organization and the acquisition, the management and use of what we call "mass capital" is a response to new changes (Garrigos-Simon, Gil-Pechuán, & Estelles-Miguel, 2015, p. 3). Crowdsourcing is a concept invented by Jeff Howe in 2006 (Howe, 2006, p. 2) and has attracted considerable attention of researchers and practitioners. Unless otherwise, it refers to the use of crowds/communities to solve problems which are expected to be resolved by internal and external customers (Brabham, 2008a, p. 82). Crowdsourcing is a tool to organize and coordinate individuals in the labour force. The internet and computer software are used to contact individuals, to offer something to them and to collect the results of the work (Grier, 2013, pp. 1-3).

Crowdsourcing requires four different elements: (1) the person managing the process and generally called the crowdsourcer (individual-crowd manager managing the workforce of communities), (2) a group of people doing the job and called the crowd, (3) a market the crowd manages the contributions of communities and known as crowdmarket. Crowd-markets are usually found on the internet sites called crowdsites or platforms, (4) a communication tool for communicating with the crowd (usually the internet).

Estellés-Areolas and Gonzalez-Ladron-de-Guevara (2012) in their literature review identified eight basic elements within 40 different definitions. These elements are as follows: A clearly defined crowd is available; a task with a clear goal is available; a clearly defined remuneration to be received by the crowd is available; the crowdsourcer is clearly defined; the task/job which will be taken in return by the crowdsourcer is also clearly defined; uses an explicit call to a variable extent; uses the internet.

Grier (2013) asserts that the internet reduces the isolation that is caused by the geography and it provides the ability to reach more people with a wider range of talent.

In light of these, Estellés-Areolas and Gonzalez-Ladron-de-Guevara (2012) have made the definition of crowdsourcing as follows:

> It is an online type of activity in which tasks are taken voluntarily through a flexible open call by a variety and a number of individuals with different information who are offered by an institution, a non-profit or a profit company. Undertaking tasks with variable complexity and infrastructure and allowing participation by bringing their jobs, their money, their information and/or experiences always requires mutual benefit. While the crowdsourcer has the thing that the user has brought into the interference which is shaped depending on the type of the activity carried out and makes advantage of it through their interests, and the user satisfies one of their certain need either for economic or social recognition, self-respect, or the development of individual skills. (p.196)

The other definitions for crowdsourcing in the literature can be collected in a table as follows:

Table 2

Definitions of Crowdsourcing

Author	Definition
Howe (2006)	"If it happens to be simply defined, crowdsourcing represents the action of transferring a job that is performed by a company's employees to a (and usually a large) network of people".
Howe (2009)	"Crowdsourcing is the action of transferring a job from a designated agent (usually an employee) who fulfils the job traditionally to an undefined, usually a large human crowd".
Brabham (2013)	"Crowdsourcing is an online, distributed problem solving and a production model which uses the collective intelligence of online communities to the last in order to serve certain organisational goals".
Oliviera et al. (2009)	"It is a form of handing over the tasks that are for intellectual asset creation to the crowd often in cooperation for the purpose of easier access to a wide range of skills and experiences".
Vukovic (2009)	"It is a new online, distributed problem solving and production model where people who are connected to a network, cooperate to complete a task".
Sloane (2011)	"It is a particular manifestation of open innovation. It is the act of transferring a task to a group of people outside of the organization, usually by making an explicit call. It is an open-source philosophy that uses a wide range of 'crowd' of developers to build the Linux operating system".
Whitla (2010)	"Crowdsourcing defines the process of company's organising a workforce which they divided among a kind of a crowd (usually online) by proposing to make a payment to everyone in 'the crowd' that accomplishes the task determined by the company".
Saxton et al. (2013)	"Crowdsourcing a sourcing model which used by organisations by using advanced internet technologies predominantly to benefit from the efforts of a virtual crowd in order to accomplish certain organisational tasks".

Source: Sanz-Blas, Tena-Monferrer, & Sánchez-García, 2015.

Crowdsourcing, as shown in Figure 2, can be best understood at the intersection of three factors: "the crowd", outsourcing and advanced internet technologies (social networks).

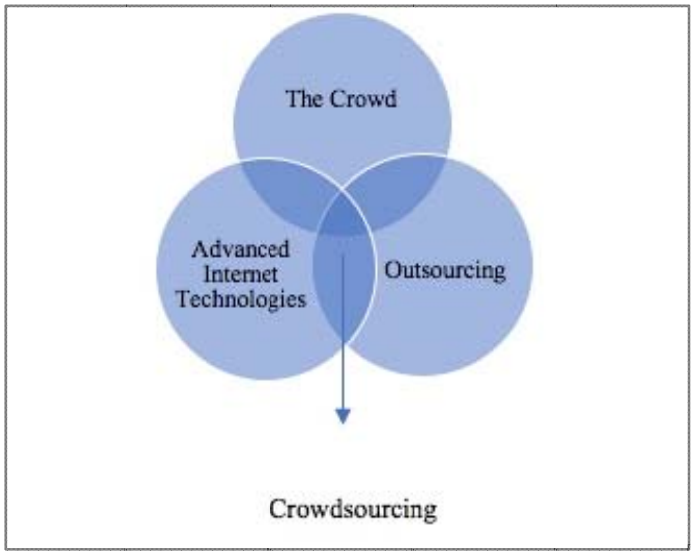

Figure 2. The three factors that define crowdsourcing. Source: Saxton, Oh, & Kishore, 2013.

According to Jayanti (2012), crowdsourcing can be divided into three basic types: crowdsourcing for content, crowdsourcing from the technical perspective, and crowdsourcing for the competition.

Crowdsourcing for content. Crowdsourcing for content organizations occurs when organisations are connected to users directly to produce content. Users are paid very little, or they do not receive any compensation and they rarely could compete for larger payments. It occurs in both for-profit and non-profit organisations.

Crowdsourcing from the technical perspective. It occurs when organizations want to take advantage of external sources for the technical, non-strategic processes which probably have gone to the contracted parties before.

Crowdsourcing for competition. It occurs when organizations persuade the very talented participants-usually in the fields of R & D, management or advertising—to compete the company's strategic or fundamental works with a technical review of the solution and the chance of a reward. Since it requires a certain level of expertise, this group of participants can be seen considered as a core workforce of highly by chance (Jayanti, 2012, p. 382).

The Definition of Crowd

Gustave Le Bon (2002) defines crowd in his work called "The Psychology of Communities" which was first published in 1912, as follows:

> The word "crowd", whatever it is that brings them together, represents a collection of individuals. From a psychological perspective, however, the crowd takes on another meaning. It is the emergence of new and very different characteristics by the combination of each individual that comprise it in certain circumstances, and only in these circumstances. (p. 2-3)

James Surowiecki (2005) specifies that not all the crowds are wise and highlights that the criteria located in the table below (Table 3) have separated intelligent communities from the irrational ones.

Table 3

Intelligent Crowd Criteria

Criteria	Explanation
Variety of ideas	Even though it is just an unusual interpretation of the known facts, each person must have a special knowledge of self.
Independence	People's ideas are not determined by the opinions of other people around them.
Decentralization	It is possible for people to specialize and to benefit from local knowledge.
Getting together	Some mechanisms exist to convert the special provisions to a joint resolution.

Source: Surowiecki, Gardner, & Audio, 2004.

Oinas-Kekkonen (2008) reflects the following eight assumptions on the wisdom of crowds based on Surowiecki's (2005) book: (1) It is possible to explain how people within a group think bodily. (2) In some cases, the groups are highly intelligent that they are cleverer than even the most intelligent people in the group. (3) For a group to be smart, three conditions are required: (a) diversity, (b) independence, and (c) decentralization. (4) The best decisions are the products of disagreement and contest. (5) Too much communication makes a group less intelligent as a whole. (6) The function of collecting information is required. (7) The right information must be delivered to the right people in the right place at the right time and in the right way. (8) There is a need to pursue experts. Lebraty and Lobre-Lebraty (2013) suggest that members of a crowd participate in the operations of crowdsourcing for two reasons: passion and interest. Crowdsourcing requires reaching a crowd that is compatible with the innovation you are trying to develop. This principle is associated with choosing the right crowdsourcing model. You must choose the right people for the right model (Howe, 2009, pp. 1-3). If someone in the group does not have the right experience, the right skills or the right connectionsin terms of the problem or task, that person cannot give anything to add value (Grier, 2013, pp. 1-3).

The different types of crowd. There are two types of innovation that the crowd can be benefited from (Grier, 2013, pp. 1-3):

Public crowds: Public crowd meets up with a public invitation. It can be comprised of the people who visit the website.

Private crowds: Private crowd begins with a group of people you already know.

Both types of crowd are divided into two classes more:

Open crowds: In open crowds, everyone who came can be taken as a member of the crowd.

Regular crowds: In regular crowds, membership can be limited with people who have specific experience, skills, or attitudes.

Crowdsourcing Process

Crowdsourcing is evaluated as a distributed problem-solving model (Brabham, 2008). In this model, the problem opens to the anonymous crowd through an open call; people come, and work on tasks, submit their solutions and they receive incentives offered on that platform. The architecture of crowdsourcing consists of three main components: platform, application, and community (L. Zhang & H. J. Zhang, 2011, p. 3). Platform will be the stage where the crowdsourcing application is conducted; the application includes all the tasks that are directed to the crowds and the crowd points out the people that will contribute to the solution of problems. A request is placed on the crowd market to source the crowd. A piece of information, an idea for a new product,

a business, a big task, and even a track of contribution can be requested. Kinds of benefits are offered in return. They can be paid for their service, they can be offered gratitude, a gift can be given, or a membership to a society may be provided (Grier, 2013, pp. 1-3).

This architecture can be modeled as in Figure 3.

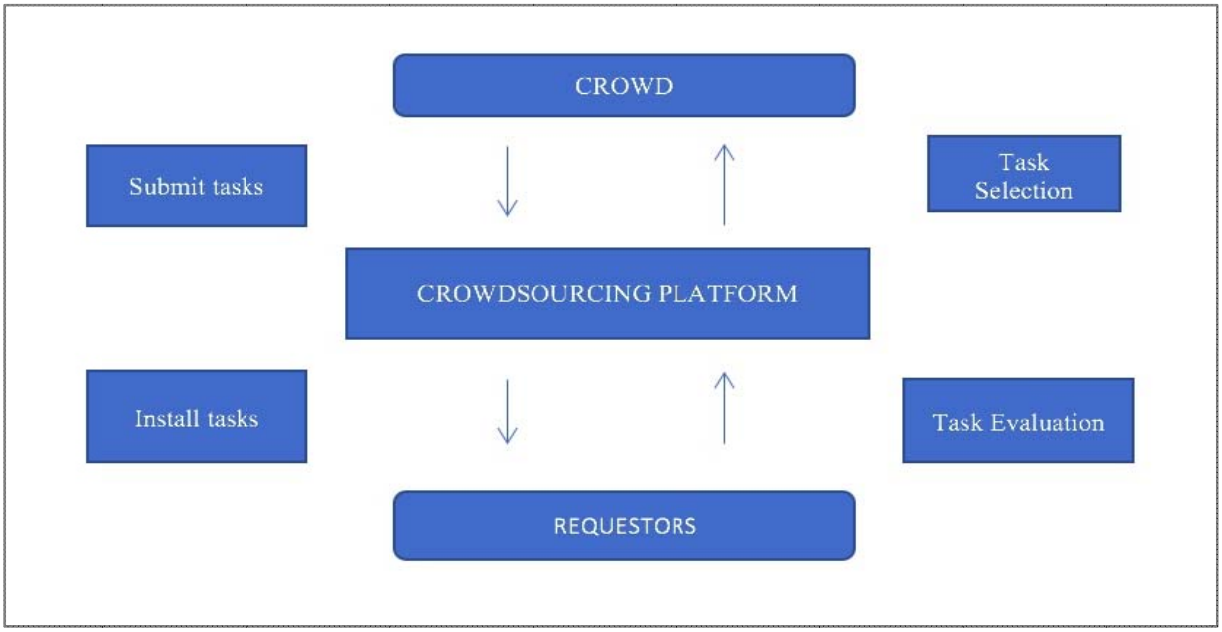

Figure 3. The architecture of crowdsourcing. Source: Thawrani, Londhe, & Singh, 2014.

Crowdsourcing platform acts as a link between the requestors and the crowd. It is the only way of interaction of the crowd and requestors. Requestors install the problem to the platform, pass it to the crowd; the crowd selects the problem and solves it and submits to the platform where the requesters access to the solution and evaluate it. A requestor is a formation that submits the request for a task and starts the process of crowdsourcing. Crowdsourcing platform is a reliable tool that allows these communities to successfully complete the task requests. Crowdsourcing platform may execute crowdsourcing requests in a number of different ways such as by doing ads of requests in the market, by allowing providers to bid on requests or presentation of the petitioner in the election of the winner of the competition will use a set of criteria in the format of a competition in which the requestor sets the criteria that will be used to select the winner submission. Requestors install the task on which they want the process of crowdsourcing to be executed, to the platform; they work on the selected task and submit back to the platform. The submitted solutions are evaluated by requestors (Thawrani, Londhe, & Singh, 2014, p. 250).

Just because the money was not used in the process as in the usual way, it does not mean that it's not a crowd market. Even though employees are voluntary, they receive something in return. They may be satisfied because they can use their skills, they may take pleasure in being able to be a part of a group, or they may have the feeling of being able to contribute to something bigger than they are. One of the best examples of this is Wikipedia. Almost all of the employees are composed of volunteers, and they do not work for money. Still, they are a part of a transaction in a market. They offer their contributions to the Wikipedia encyclopaedia and even if their words become an encyclopaedic fixture, they do not receive any compensation for this.

Nevertheless, each person experiences some sort of satisfaction for contributing to a common corpus of human knowledge (Grier, 2013, pp. 1-3).

Types of Crowdsourcing

Crowdsourcing may occur in many different ways. It can be performed with people in large groups, with small teams and even with individuals. It can be benefited from the people who live near or on the other end of the planet. Through crowdsourcing, the intellectual and creative abilities of individuals or their physical strength can be used, or you may demand money.

Grier (2013) and Estellés-Areolas and Gonzalez-Ladron-de-Guevara (2012) suggest that there are six main types of crowdsourcing: crowdcontests or crowdcasting; crowdcollaboration; crowdcontent; self-organizing crowd; crowdfunding; crowdopinion.

Crowdcontests or crowdcasting. It is a type of crowdsourcing similar to a contest where the problem or task is directed to the crowd and the best solution or the first solution offered is rewarded (Estellés-Arolas et al., 2015, p. 40). In this type, there is an undivided, single job and it is given to a single person to complete the job, Because that person is trusted mainly, and the best possible person is asked to do the job. Therefore, crowd members are asked to submit their best and competition is established between them. The person who makes the best submission is elected and that person is rewarded for it (Grier, 2013, pp. 1-3).

Crowdcollaboration. It is a type crowdsourcing where the process occurs among individuals and the crowd while the one has started the process remained on the side-lines (Estellés-Arolas et al., 2015, p. 40). Each job is divided into specific, large parts that require special skills. Each piece is given to members with these special abilities within the crowd. The one offering the job manages the process and pays those who do the job. It can be said there are two sub-types with different ultimate goals (Estellés-Arolas et al., 2015, p. 40);

Crowdstorming. They are giant sized online brainstorming sessions where different ideas are produced, and the crowd supports these ideas by their votes and comments.

Crowdsupport. In this type, customers settle the doubts and problems of other customers so that they do not need official customer support.

Crowdcontent. In its simplest form, crowdsourcing is a way of connecting organizations to potential employees via the Internet. Crowdsourcing especially appears to be a good way to assign small tasks which are called crowd-contents (Brabham, 2013, pp. 1-3). In such crowdsourcing tasks, the information or the labour force which is required to find or create content in a variety of ways is used in a non-contest way (Estellés-Arolas et al., 2015, p. 40). The job is divided into open, small tasks to involve more members from the crowd and to get the job done more quickly. Each submission is evaluated without the capabilities of potential employees who are being seen or before interviewing with them and the appropriate ones are accepted. Then the members of the crowd, who have done the job for you, are paid (Grier, 2013, pp. 1-3). It can be said that this type of crowdsourcing has got three subtypes (Estellés-Arolas et al., 2015, p. 40):

Crowd production. Since tagging images and translating small texts are individual jobs, the crowd needs to create content in this type of crowdsourcing. E.g. Amazon Mechanical Turk and Wikipedia.

Crowd investigation. It is a crowdsourcing type in which the crowd makes a research over the Internet for any purpose. E.g. Peer to Patent Review.

Crowd analysis. It is a crowdsourcing type in which the crowd makes research not over the Internet but on multimedia documents such as video or images.

Self-organizing crowd. The crowd decides how to divide the job. A prize is offered for the person or the group that will do the job best. A deadline is determined, and the crowd is allowed to work. When the deadline arrives, different submissions are reviewed; the best of them is selected and rewarded (Grier, 2013, pp. 1-3). For years, it has been the most widely used format of crowdsourcing for innovation.

Crowdfunding. It is sort of a funding model that individuals use the Internet to contribute a relatively small amount of money in the creation of a particular product or in investing a particular business idea (Brabham, 2013, pp. 1-3). It can be defined as a resource that enables a person who starts a project to obtain financing from internet users. This funding may contain all or a part of the capital needs of the one who has started the project (Lebraty & Lobre-Lebraty, 2013, pp. 1-3). In this type, an individual, an organization, or a company demands a fund from the crowd in return for a reward (Estellés-Arolas et al., 2015, p. 40). This model at the same time works for early stage companies seeking crowd fund for angel investors and for small business loans (Brabham, 2013, pp. 1-3). The crowd is used for the purpose of raising money for a company, a charity, or an artistic work. So to say, a hat is extended to the crowd and is asked to donate or equities are sold to collect money for a company.

Crowd opinion. The purpose of this type is to learn the user's thoughts about a particular problem or product through votes, comments, tags, and even the sale of the shares (Estellés-Arolas et al., 2015, p. 40). It contains projects that are aimed at feedback from users about a specific topic or product which the participants contribute with their ideas or assessments. If it's done by voting, it is called crowd-voting (Estellés-Arolas et al., 2015, p. 40).

Research Methodology

The Aim of the Study

The aim of this study is to explain the open innovation which is a newer concept and to provide a better understanding of the concept of "Crowdsourcing" which is a tool of open innovation within the framework of innovation. Within this context, the goal of the study is to reveal the availability of university students as a crowd which is the most important source of crowdsourcing method.

Research Method

Literature review has been made on innovation, open innovation and crowdsourcing; the qualitative part of the study has been revealed from national and international sources. The quantitative part of the study has been formed according to the survey results obtained from Altinbas University students. The scale of the survey has been formed by the researcher due to the lack of scales on this subject. The results of the survey have been evaluated by considering frequency distributions and the hypotheses were interpreted based on five variables (gender, age, class, type of academic unit, and type of education).

The Study Sample

Altinbas University students have been appointed as the sample of this study to represent the university students in Turkey. The university was established in 2008 and accepted its first students in the academic year 2011-2012. Altınbaş University has got eight faculties (Dentistry, Pharmacy, Fine Arts and Design, Law, Economics, Administrative and Social Sciences, Engineering and Natural Sciences, Faculty of Medicine), three institutes (Physical Sciences, Social Sciences, Health Sciences), and two vocational school (Vocational School,

Vocational School of Health Services) with 23 undergraduate degree, 19 associate's degree, six Master's degree programs, and two doctorate programs.

Hypotheses of the Study

Hypothesis 1: There is a significant relationship between the views on intellectual activities and gender.

Hypothesis 2: There is a significant relationship between the views on intellectual activities and age.

Hypothesis 3: There is a significant relationship between the views on intellectual activities and academic unit.

Hypothesis 4: There is a significant relationship between the views on intellectual activities and class.

Hypothesis 5: There is a significant relationship between the views on intellectual activities and the type of education.

Results

The data obtained in the study were analysed with the help of SPSS (Statistical Package for Social Sciences) 22.0 for Windows. Numbers and percentages were used for data analysis, as descriptive statistical methods. The relationship between the views on intellectual activities and descriptive properties has been tested by chi-square analysis. Findings have been evaluated at a significance level of 5% with 95% confidence interval.

Table 4

The Distribution of Descriptive Characteristics of Students

	Groups	Frequency (n)	Percentage (%)
Gender	Female	304	67.6
	Male	146	32.4
	Total	450	100.0
Age	18-20	271	60.2
	21-23	159	35.3
	24+	20	4.4
	Total	450	100.0
Unit	Faculty	202	44.9
	Vocational school	248	55.1
	Total	450	100.0
Department	Justice	15	3.3
	Computer Programming	20	4.4
	Child Development	57	12.7
	Foreign Trade	29	6.4
	Graphic Design	22	4.9
	Occupational Health and Safety	31	6.9
	Business Administration	10	2.2
	Jewelry and Jewelry Design	1	0.2
	Health Institutions Administration	20	4.4
	Social Services	33	7.3
	Civil Aviation and Cabin Services	13	2.9
	Pharmacy	4	0.9
	Law	31	6.9
	Graphic Design (Bachelor)	2	0.4

Table 4 to be continued

	Interior Architecture and Environmental Design	7	1.6
	Fashion and Textile Design	12	2.7
	Jewelry Design	12	2.7
	Economy	3	0.7
	Business Administration (Bachelor)	4	0.9
	Political Science and Public Administration	9	2.0
	International Relations	10	2.2
	International Logistics Management	2	0.4
	International Trade	3	0.7
	Psychology	12	2.7
	Sociology	17	3.8
	Computer Engineering	19	4.2
	Electrical and Electronics Engineering	12	2.7
	Industrial Engineering	7	1.6
	Civil Engineering	14	3.1
	Mechanical Engineering	7	1.6
	Architecture	8	1.8
	Basic Sciences	1	0.2
	Medicine	2	0.4
	Dentistry	1	0.2
	Total	450	100.0
Class	Preparation class	22	4.9
	1st year	200	44.4
	2nd year	126	28.0
	3rd year	66	14.7
	4th year	36	8.0
	Total	450	100.0

Hypothesis 1: There is a significant relationship between the views on intellectual activities and gender.

Table 5

The Relationship Between the Views on Intellectual Activities and Gender

		Female		Male	p	
		n	%	n	%	
Willingness to participate in intellectual activities	Yes	255	83.9	107	73.3	$X^2 = 7.037$
	No	49	16.1	39	26.7	$p = 0.006$
Reward expectation in intellectual activities	Yes	231	90.6	91	85.0	$X^2 = 2.355$
	No	24	9.4	16	15.0	$p = 0.090$
The expected reward type in intellectual activities	Material	174	68.2	86	80.4	$X^2 = 5.488$
	Immaterial	81	31.8	21	19.6	$p = 0.012$
The expected reward content in intellectual activities	Money	68	26.7	49	45.8	
	Scholarship	65	25.5	16	15.0	
	Book support	6	2.4	1	0.9	
	Food support	7	2.7	4	3.7	$X^2 = 19.981$
	Computer-tablet-mobile phone	8	3.1	5	4.7	$p = 0.006$
	Internship-job opportunity	77	30.2	30	28.0	
	Travel-vacation	21	8.2	2	1.9	
	Gift vouchers depend on the company's products	3	1.2	0	0.0	

Table 5 to be continued

Type of companies preferred for providing ideas	Food	39	15.3	19	17.8	
	Cloth	93	36.5	19	17.8	$X^2 = 23.296$
	Informatics	46	18.0	36	33.6	$p = 0.000$
	Media	51	20.0	14	13.1	
The preference of the way of receiving the call to provide ideas	Bank	13	5.1	7	6.5	
	Automotive	13	5.1	12	11.2	
	E-mail	151	59.2	57	53.3	
	SMS	63	24.7	25	23.4	
	University web site	11	4.3	10	9.3	$X^2 = 6.786$ $p = 0.148$
	Banner	8	3.1	1	0.9	
	Stand at the university	22	8.6	14	13.1	
Willingness to announce their names once their ideas have been approved	Yes	221	86.7	87	81.3	$X^2 = 1.705$
	No	34	13.3	20	18.7	$p = 0.127$
Preference on the way of announcement of their names	Company web site	102	46.2	41	47.1	
	University web site	60	27.1	10	11.5	$X^2 =$
	Television ad	31	14.0	24	27.6	13.355
	Paper ad	6	2.7	2	2.3	$p = 0.010$
	Billboard	22	10.0	10	11.5	

There has been a significant relation between gender and willingness to participate in intellectual activities ($X^2 = 7.037$; $p = 0.006 < 0.05$). There has been no significant relation between gender and the expectation of a reward ($X^2 = 2.355$; $p = 0.090 > 0.05$). There has been no significant relation between gender and the expected reward content in intellectual activities ($X^2 = 5.488$; $p = 0.012 < 0.05$). There has been a significant relation between gender and content of the expected material reward in intellectual activities ($X^2 = 19.981$; $p = 0.006 < 0.05$). There has been a significant relation between gender and type of companies preferred for providing ideas ($X^2 = 23.296$; $p = 0.000 < 0.05$). There has been no significant relation between gender and the preference of the way of receiving the call to provide ideas ($X^2 = 6.786$; $p = 0.148 > 0.05$). There has been no significant relation between gender and willingness to announce their names once their ideas have been approved ($X^2 = 1.705$; $p = 0.127 > 0.05$). There has been a significant relation between gender and preference on the way of announcement of their names ($X^2 = 13.355$; $p = 0.010 < 0.05$).

Hypothesis 2: There is a significant relationship between the views on intellectual activities and age.

Table 6

The Relationship Between the Views on Intellectual Activities and Age

		18-20		21-23		24+		p
		n	%	n	%	n	%	
Willingness to participate in intellectual activities	Yes	221	81.5	125	78.6	16	80.0	$X^2 = 0.551$
	No	50	18.5	34	21.4	4	20.0	$p = 0.759$
Reward expectation in intellectual activities	Yes	198	89.6	109	87.2	15	93.8	$X^2 = 0.857$
	No	23	10.4	16	12.8	1	6.2	$p = 0.651$
The expected reward type in intellectual activities	Material	145	65.6	102	81.6	13	81.2	$X^2 = 10.821$
	Immaterial	76	34.4	23	18.4	3	18.8	$p = 0.004$

Table 6 to be continued

The expected reward content in intellectual activities	Money	71	32.1	41	32.8	5	31.2	
	Scholarship	53	24.0	25	20.0	3	18.8	
	Book support	5	2.3	2	1.6	0	0.0	
	Food support	8	3.6	3	2.4	0	0.0	$X^2 = 16.935$ p = 0.260
	Computer-tablet-mobile phone	5	2.3	8	6.4	0	0.0	
	Internship-job opportunity	63	28.5	40	32.0	4	25.0	
	Travel-vacation	14	6.3	5	4.0	4	25.0	
	Gift vouchers depend on the company's products	2	0.9	1	0.8	0	0.0	
Type of companies preferred for providing ideas	Food	42	19.0	15	12.0	1	6.2	
	Cloth	72	32.6	33	26.4	7	43.8	
	Informatics	43	19.5	34	27.2	5	31.2	$X^2 = 13.542$ p = 0.195
	Media	41	18.6	21	16.8	3	18.8	
The preference of the way of receiving the call to provide ideas	Bank	10	4.5	10	8.0	0	0.0	
	Automotive	13	5.9	12	9.6	0	0.0	
	E-mail	125	56.6	74	59.2	9	56.2	
	SMS	56	25.3	30	24.0	2	12.5	
	University web site	14	6.3	7	5.6	0	0.0	$X^2 = 20.837$ p = 0.008
	Banner	5	2.3	1	0.8	3	18.8	
	Stand at the university	21	9.5	13	10.4	2	12.5	
Willingness to announce their names once their ideas have been approved	Yes	188	85.1	106	84.8	14	87.5	$X^2 = 0.082$ p = 0.960
	No	33	14.9	19	15.2	2	12.5	
Preference on the way of announcement of their names	Company web site	86	45.7	51	48.1	6	42.9	
	University web site	51	27.1	15	14.2	4	28.6	
	Television ad	32	17.0	22	20.8	1	7.1	$X^2 = 11.878$ p = 0.157
	Paper ad	5	2.7	3	2.8	0	0.0	
	Billboard	14	7.4	15	14.2	3	21.4	

There has been no significant relation between age and willingness to participate in intellectual activities ($X^2 = 0.551$; $p = 0.759 > 0.05$). There has been no significant relation between age and the expectation of a reward ($X^2 = 0.857$; $p = 0.651 > 0.05$). There has been a significant relation between age and the expected reward content in intellectual activities ($X^2 = 10.821$; $p = 0.004 < 0.05$). There has been no significant relation between age and content of the expected material reward in intellectual activities ($X^2 = 16.935$; $p = 0.260 > 0.05$). There has been no significant relation between age and type of companies preferred for providing ideas ($X^2 = 13.542$; $p = 0.195 > 0.05$). There has been a significant relation between age and the preference of the way of receiving the call to provide ideas ($X^2 = 20.837$; $p = 0.008 < 0.05$). There has been no significant relation between age and willingness to announce their names once their ideas have been approved ($X^2 = 0.082$; $p = 0.960 > 0.05$). There has been no significant relation between age and preference on the way of announcement of their names ($X^2 = 11.878$; $p = 0.157 > 0.05$).

Hypothesis 3: There is a significant relationship between the views on intellectual activities and academic unit.

Table 7

The Relationship Between the Views on Intellectual Activities and Academic Unit

		Faculty		Vocational school		p
		n	%	n	%	
Willingness to participate in intellectual activities	Yes	158	78.2	204	82.3	$X^2 = 1.155$
	No	44	21.8	44	17.7	$p = 0.170$
Reward expectation in intellectual activities	Yes	143	90.5	179	87.7	$X^2 = 0.691$
	No	15	9.5	25	12.3	$p = 0.255$
The expected reward content in intellectual activities	Material	124	78.5	136	66.7	$X^2 = 6.141$
	Immaterial	34	21.5	68	33.3	$p = 0.009$
Type of companies preferred for providing ideas	Money	50	31.6	67	32.8	
	Scholarship	40	25.3	41	20.1	
	Book support	1	0.6	6	2.9	
	Food support	5	3.2	6	2.9	$X^2 = 8.855$
	Computer-tablet-mobile phone	7	4.4	6	2.9	$p = 0.263$
	Internship-job opportunity	42	26.6	65	31.9	
	Travel-vacation	13	8.2	10	4.9	
	Gift vouchers depend on the company's products	0	0.0	3	1.5	
The preference of the way of receiving the call to provide ideas	Food	26	16.5	32	15.7	
	Cloth	47	29.7	65	31.9	
	Informatics	41	25.9	41	20.1	$X^2 = 5.095$
	Media	30	19.0	35	17.2	$p = 0.404$
	Bank	5	3.2	15	7.4	
	Automotive	9	5.7	16	7.8	
	E-mail	93	58.9	115	56.4	
	SMS	33	20.9	55	27.0	
	University web site	11	7.0	10	4.9	$X^2 = 2.627$
	Banner	5	3.2	4	2.0	$p = 0.622$
	Stand at the university	16	10.1	20	9.8	
Willingness to announce their names once their ideas have been approved	Yes	129	81.6	179	87.7	$X^2 = 2.610$
	No	29	18.4	25	12.3	$p = 0.072$
Preference on the way of announcement of their names	Company web site	65	50.4	78	43.6	
	University web site	15	11.6	55	30.7	$X^2 =$
	Television ad	26	20.2	29	16.2	25.765
	Paper ad	1	0.8	7	3.9	$p = 0.000$
	Billboard	22	17.1	10	5.6	

There has been no significant relation between unit and willingness to participate in intellectual activities ($X^2 = 1.155$; $p = 0.170 > 0.05$). There has been no significant relation between unit and the expectation of a reward ($X^2 = 0.691$; $p = 0.255 > 0.05$). There has been a significant relation between unit and the expected reward content in intellectual activities ($X^2 = 6.141$; $p = 0.009 < 0.05$). There has been no significant relation between unit and content of the expected material reward in intellectual activities ($X^2 = 8.855$; $p = 0.263 > 0.05$). There has been no significant relation between unit and type of companies preferred for providing ideas ($X^2 = 5.095$; $p = 0.404 > 0.05$). There has been no significant relation between unit and the preference of the way of receiving the call to provide ideas ($X^2 = 2.627$; $p = 0.622 > 0.05$). There has been no significant relation between unit and willingness to announce their names once their ideas have been approved ($X^2 = 2.610$; $p =$

0.072 > 0.05). There has been a significant relation between unit and preference on the way of announcement of their names ($X^2 = 25.765$; $p = 0.000 < 0.05$).

Hypothesis 4: There is a significant relationship between the views on intellectual activities and class.

Table 8

The Relationship Between the Views on Intellectual Activities and Class

		Prep.		1st year		2nd year		3rd year		4th year		p
		n	%	n	%	n	%	n	%	n	%	
Willingness to participate in intellectual activities	Yes	18	81.8	165	82.5	100	79.4	49	74.2	30	83.3	$X^2 = 2.462$
	No	4	18.2	35	17.5	26	20.6	17	25.8	6	16.7	$p = 0.652$
Reward expectation in intellectual activities	Yes	17	94.4	147	89.1	86	86.0	46	93.9	26	86.7	$X^2 = 2.811$
	No	1	5.6	18	10.9	14	14.0	3	6.1	4	13.3	$p = 0.590$
The expected reward type in intellectual activities	Material	14	77.8	111	67.3	70	70.0	40	81.6	25	83.3	$X^2 = 6.462$
	Immaterial	4	22.2	54	32.7	30	30.0	9	18.4	5	16.7	$p = 0.167$
The expected reward content in intellectual activities	Money	5	27.8	58	35.2	25	25.0	18	36.7	11	36.7	
	Scholarship	10	55.6	45	27.3	16	16.0	6	12.2	4	13.3	
	Book support	0	0.0	5	3.0	1	1.0	0	0.0	1	3.3	
	Food support	1	5.6	2	1.2	5	5.0	2	4.1	1	3.3	$X^2 = 47.993$ $p = 0.011$
	Computer-tablet-mobile phone	0	0.0	4	2.4	3	3.0	3	6.1	3	10.0	
	Internship-job opportunity	2	11.1	44	26.7	37	37.0	16	32.7	8	26.7	
	Travel-vacation	0	0.0	7	4.2	10	10.0	4	8.2	2	6.7	
	Gift vouchers depend on the company's products	0	0.0	0	0.0	3	3.0	0	0.0	0	0.0	
Type of companies preferred for providing ideas	Food	2	11.1	31	18.8	13	13.0	8	16.3	4	13.3	
	Cloth	7	38.9	48	29.1	34	34.0	12	24.5	11	36.7	
	Informatics	5	27.8	33	20.0	19	19.0	16	32.7	9	30.0	$X^2 = 19.366$ $p = 0.498$
	Media	2	11.1	32	19.4	19	19.0	7	14.3	5	16.7	
	Bank	2	11.1	9	5.5	8	8.0	0	0.0	1	3.3	
The preference of the way of receiving the call to provide ideas	Automotive	0	0.0	12	7.3	7	7.0	6	12.2	0	0.0	
	E-mail	8	44.4	94	57.0	60	60.0	31	63.3	15	50.0	
	SMS	4	22.2	47	28.5	21	21.0	7	14.3	9	30.0	$X^2 = 15.084$ $p = 0.518$
	University web site	3	16.7	6	3.6	7	7.0	3	6.1	2	6.7	
	Banner	0	0.0	3	1.8	2	2.0	3	6.1	1	3.3	
	Stand at the university	3	16.7	15	9.1	10	10.0	5	10.2	3	10.0	
Willingness to announce their names once their ideas have been approved	Yes	17	94.4	141	85.5	88	88.0	38	77.6	24	80.0	$X^2 = 4.732$ $p = 0.316$
	No	1	5.6	24	14.5	12	12.0	11	22.4	6	20.0	
Preference on the way of announcement of their names	Company web site	10	58.8	60	42.6	44	50.0	18	47.4	11	45.8	
	University web site	5	29.4	35	24.8	24	27.3	2	5.3	4	16.7	$X^2 = 35.060$ $p = 0.004$
	Television ad	0	0.0	30	21.3	15	17.0	6	15.8	4	16.7	
	Paper ad	0	0.0	6	4.3	1	1.1	1	2.6	0	0.0	
	Billboard	2	11.8	10	7.1	4	4.5	11	28.9	5	20.8	

There has been no significant relation between year and willingness to participate in intellectual activities ($X^2 = 2.462$; $p = 0.652 > 0.05$). There has been no significant relation between year and the expectation of a reward ($X^2 = 2.811$; $p = 0.590 > 0.05$). There has been no significant relation between year and the expected reward content in intellectual activities ($X^2 = 6.462$; $p = 0.167 > 0.05$). There has been a significant relation between year and content of the expected material reward in intellectual activities ($X^2 = 47.993$; $p = 0.011 <$

0.05). There has been no significant relation between year and type of companies preferred for providing ideas (X^2 = 19.366; p = 0.498 > 0.05). There has been no significant relation between year and the preference of the way of receiving the call to provide ideas (X^2 = 15.084; p = 0.518 >.0.05). There has been no significant relation between year and willingness to announce their names once their ideas have been approved (X^2 = 4.732; p = 0.316 > 0.05). There has been a significant relation between year and preference on the way of announcement of their names (X^2 = 35.060; p = 0.004 < 0.05).

Hypothesis 5: There is a significant relationship between the views on intellectual activities and the type of education.

Table 9

The Relationship Between the Views on Intellectual Activities and the Type of Education

		Scholar		Fee-paying		p
		n	%	n	%	
Willingness to participate in intellectual activities	Yes	319	80.8	43	78.2	X^2 = 0.204 p = 0.384
	No	76	19.2	12	21.8	
Reward expectation in intellectual activities	Yes	282	88.4	40	93.0	X^2 = 0.824 p = 0.269
	No	37	11.6	3	7.0	
The expected reward type in intellectual activities	Material	228	71.5	32	74.4	X^2 = 0.162 p = 0.420
	Immaterial	91	28.5	11	25.6	
The expected reward content in intellectual activities	Money	103	32.3	14	32.6	
	Scholarship	66	20.7	15	34.9	
	Book support	7	2.2	0	0.0	
	Food support	10	3.1	1	2.3	X^2 = 7.877 p = 0.344
	Computer-tablet-mobile phone	12	3.8	1	2.3	
	Internship-job opportunity	97	30.4	10	23.3	
	Travel-vacation	22	6.9	1	2.3	
	Gift vouchers depend on the company's products	2	0.6	1	2.3	
Type of companies preferred for providing ideas	Food	49	15.4	9	20.9	
	Cloth	99	31.0	13	30.2	
	Informatics	74	23.2	8	18.6	X^2 = 9.294 p = 0.098
	Media	60	18.8	5	11.6	
The preference of the way of receiving the call to provide ideas	Bank	19	6.0	1	2.3	
	Automotive	18	5.6	7	16.3	
	E-mail	185	58.0	23	53.5	
	SMS	74	23.2	14	32.6	X^2 = 5.119 p = 0.275
	University web site	17	5.3	4	9.3	
	Banner	9	2.8	0	0.0	
	Stand at the university	34	10.7	2	4.7	
Willingness to announce their once their ideas have been approved	Yes	269	84.3	39	90.7	X^2 = 1.212 p = 0.194
	No	50	15.7	4	9.3	
Preference on the way of announcement of their names	Company web site	126	46.8	17	43.6	
	University web site	64	23.8	6	15.4	X^2 = 6.282 p = 0.179
	Television ad	46	17.1	9	23.1	
	Paper ad	5	1.9	3	7.7	
	Billboard	28	10.4	4	10.3	

There has been no significant relation between type of education and willingness to participate in intellectual activities ($X^2 = 0.204$; $p = 0.384 > 0.05$). There has been no significant relation between type of education and the expectation of a reward ($X^2 = 0.162$; $p = 0.420 > 0.05$). There has been no significant relation between year and the expected reward content in intellectual activities ($X^2 = 6.462$; $p = 0.167 > 0.05$). There has been no significant relation between type of education and content of the expected material reward in intellectual activities ($X^2 = 7.877$; $p = 0.344 > 0.05$). There has been no significant relation between type of education and type of companies preferred for providing ideas ($X^2 = 9.294$; $p = 0.098 > 0.05$). There has been no significant relation between type of education and the preference of the way of receiving the call to provide ideas ($X^2 = 5.119$; $p = 0.275 > 0.05$). There has been no significant relation between type of education and willingness to announce their names once their ideas have been approved ($X^2 = 1.212$; $p = 0.194 > 0.05$). There has been no significant relation between type of education and preference on the way of announcement of their names ($X^2 = 6.282$; $p = 0.179 > 0.05$).

Conclusion

The tests which have been held through to the hypotheses have been carried out under consideration of five variables: gender, age, unit (vocational school, faculty), class, and education type. Considering the test results with the variable gender, it has been revealed that there is a significant relationship between the views on intellectual activities and gender. In other words, either female students are more outgoing than male students or they are more willing to prove themselves. However, the expectation of reward has no connection with gender differences because actually, all of the students are in expectation of a reward without gender difference and their reward expectations are materialistic. However, the content of the award varies according to gender. Female students have preferred more of the opportunity for internship and job, while male students have tended towards money. It may be considered that female students are seeking to ensure to find a job after graduating because it is more difficult for them to find a job compared to male students. Considering the type of company, female students have preferred mostly clothing companies, while male students have preferred informatics companies. So, it would not be wrong to say that the gender difference in their choices in normal life has been reflected to their choices here, as well. While men more likely tend to informatics, women generally tend to clothes and fashion. Considering the way of taking calls, both genders have preferred to receive the call via e-mail or text message. It can be said that this result is directly proportional with the young population's use of technology today. Since mobile phones or internet are the most used communication tools, it is normal to have such a result.

Once their ideas are approved, both genders have been willing to have their names announced. Considering the way of announcing their names, both genders have also preferred the Internet and they have wanted their name to be announced on the company's website. Since Internet is the most common communication, this has affected the choice here. Considering the results based on the second variable, the age factor, it is clear that this factor is not affective on joining intellectual activities. So, a large majority of these three ranges of age have replied this as "yes". Like gender, in age factor, regardless of the range, there is expectation of reward and in a way; this can be interpreted as the need to be satisfied. It can be said that that's why there is award in the skeletal structure of the method of crowdsourcing. People need to be paid off their hard work and efforts in a way. The age factor seems to be more important within the context of reward.

While younger students have tended to mostly non-material rewards of, as the age has increased, the rate has decreased. The content of the material reward has been classified under three headings regardless of age:

money, scholarship, and internship-job opportunity. This can be explained with the desire of the university students to secure their future after graduating because they concern for their future. They have financial concerns about their future in this period of their lives. No difference by age has appeared according to the type of company. The effect of the age factor in the preference of receiving the call has been observed. Although receiving a call via e-mail is the first preference of all three age groups, as the range of age has grown, the second preference has shifted through banners. The Internet can be the reason of preference of the students whose ages are 18-20. The students whose age is over 24 may have preferred the printed visual communication tools. All three age groups have been willing to have their names announced. It can be interpreted as the will to receive the reward in return their efforts. Considering the announcement of the name, age has not been an important factor. All of the three age groups have given the priority to company's website. Considering the third variable, the unit (vocational school/faculty), it is seen that there is no difference in the will to participate in intellectual activities. Students of both units have shown a high percentage of will to participate. The unit has made no difference in expectation of reward; students have emphasized their expectations of the reward. Considering the content of the reward, students of vocational school have preferred mostly non-material rewards while students of faculties have preferred mostly material rewards. The unit has not been an influential factor in the choice of content of the material reward. Both faculty and vocational school students have respectively made choice of the same three: money, internship-job opportunity, and scholarship. Here, too, as in the age variable, it is possible to say that most of university students are in need of financial support. In the same way, no unit difference has been observed in the choice of the type of company. The same sort has been seen in both groups: clothing, informatics, and media. So, this shows that students have been affected by the same things and have made their preferences in the same direction. Since students' interests have not differed according to the unit, their preferences have resulted in the same direction.

Considering the preference of the way of receiving the call to provide ideas, it has been observed that the unit has not been a distinctive element. Most of the students have chosen to take the call via text message or e-mail. Given the technology they use to communicate today, it has not been surprising that their preferences have been in this way. Students of both units have been eager about the announcement of their names. However, a difference has been observed between units about the way of the announcement of their names. While students of both units have determined company's website as their first choice, they have been differed in the second preferences. Second choice of faculty students has been television commercial, while the second choice of vocational school students has been the school's web site. In this sense it can be said that faculty students are more eager about the announcement of their names. When the results have been assessed according to the fourth variable which is the class, no difference in the will to participate intellectual activities has been observed again. Likewise, the expectation of reward has not differed in this variable; the vast majority of students have reward expectancy. The preference for content of the award also has been on material rewards for all classes. However, there has been a difference in preference of the content of material reward between the classes. While the first choice of preparation class students has been scholarship, the choices of 1st year students have been on money, then scholarship. For 2nd year students the internship has been their priority; for 3rd and 4th year students, money has been their priority. While the students at the beginning stage of school have preferred scholarships and internships to be able to learn their professions better and to have a better education, the needs of the 3rd year and 4th year students who prepare to embark on life have been more of material. In addition, if we consider 2nd year as the graduating class for vocational school students, the result

through first choice as internship is not surprising, because internship is essential for vocational school students in order to get a job. There is no difference between the classes regarding the type of company to provide ideas because students generally tend to same things. Trends focus on clothing and informatics companies. Trends of university students have been reflected to their preferences in general.

The choice of receiving the call to provide an idea has also been the same for all years. The first choice of all classes has been e-mailing, then SMS. The communication preferences of students in their daily lives have also been reflected in here. In other words, it can be said that preferences have been formed through the Internet or mobile communication. Year has not been a distinctive element about the announcement of their names; all students of all years wish their names to be announced which reflects their desire for the introduction of their efforts, appreciation, and approval. However, there is a difference regarding the way of the announcement of their names. While the first choice of the preparation year, 1st year and 2nd year students have been the company's web site and the second choice of them is school's web site; the second choice of 3rd and 4th year students has been billboard. So, while preparation year, 1st, and 2nd year students keep their desire for recognition more limited, 3rd and 4th year students have been more anxious about the recognition. When the results related the last variable, which is the type of learning (scholarship/fee) examined, it has been observed that the type of education does not have a distinctive impact on willingness to participate in intellectual activities. Likewise, it does not have a distinctive impact on the expectation of reward; the vast majority of students have been in expectation of reward and the type of the reward has been determined as material. Considering the needs of a student, this seems perfectly normal. The content of the expected material reward has centred upon the same preferences: money, internship-job opportunity, and scholarship. As mentioned in the previous variables, material needs are the needs students need the most during their education life; therefore, it is natural for the choice to be this way. Type of companies preferred for providing ideas does not differ according to this variable either. Clothing and informatics companies have been the priorities in preference of companies. The type of education has not been a distinctive element in the preference of the way of receiving the call to provide ideas. As with other variables, the choice of receiving a call has been in the form of e-mail and SMS. Willingness on names to be announced once their ideas have been approved has not changed for this variable either; the vast majority of students are eager to announce their names. There has been no difference in the way of the announcement of the name in terms of the type of education. Company's web site has been the first choice of the students.

As a result, elements that give the same results have emerged according to the variables such as gender, age, unit, class, and type of education. Willingness to participate in intellectual activities has been high for all variables and that has proven that university student community is to be a good crowd for crowdsourcing. University students have shown that they would volunteer for such an activity. When companies make such a demand, participation can be expected to be high. As for this study, it is also obvious that a true crowd has been chosen to be measured. However, when the university students have been chosen a target crowd, it should be noted that the other element is the expectation of reward that does not differ according to variables. "The reward" which is one of the important elements of crowdsourcing is important for this crowd as well. The award will be presented to students who must be specified clearly. Thus, the participation may be even higher. Another factor which is common to all the variables is the way of receiving the call. As noted earlier, the ways the students prefer to communicate nowadays have a major impact on the way students have preferred to receive the calls. Since their communications are through the Internet or mobile communication. It should be

another important evidence for choosing the university students as the target crowd, because crowdsourcing is a method that is executed over the internet and university students' community is a very convenient crowd to this method.

The last element not differed according to variables has been their willingness for their names to be announced. Students have been in favour of announcing their names once their ideas have been approved, no matter what they want to be liked, appreciated, and recognised.

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