CROWD LOGISTICS - A NEW CONCEPT IN REALIZATION OF LOGISTICS SERVICES

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Abstract: *Crowd logistics is based on the idea of a network of connected members that realize the transport of goods in order to improve the efficiency and sustainability of the physical movement of goods, as well as their storage, delivery and use around the world. Crowd logistics relies on individuals who are connected with mobile technologies and focus is on small operations. The essence of crowd logistics is to create a connection between people who have certain logistics resources and those with logistics needs. The aim is to minimize inefficient use of resources and use free capacities. In this paper the solutions applied in practice have been explored. Among other things, a detailed overview of different types has been given. In this research 73 active services were identified and divided in three new groups defined in this paper. An increase in the number of new services on an annual level of about 10% was observed.*

Keywords*: crowdsourcing, crowd logistics, delivery, network*

1. INTRODUCTION

During the past decade there have happened various changes in the ways that world functions, and significant part of that represent changes in the field of information technologies use. Nowadays, technologies are inevitable part of everyday life regardless of whether they are used by children, adults or elder.

One of the areas that IT (information technologies) has significant impact on is certainly logistics. Technologies such as: blockchain, robotics, 3D printing, augmented reality etc. have enabled progress in logistics operations that provide better efficiency and lower costs in entire supply chain. This is due to quicker respond to critical situations by providing intelligent solutions combining human knowledge and accuracy of IT. It is also possible to predict future situations and prepare for them using all the advantages of existing resources. Essential parts of every logistical system are transport and warehousing of goods on their way to the final user. These processes should be done in the way that will lead to maximization of final user's satisfaction, and it requires reliability and accuracy in their realization. IT solutions are what makes that possible if used appropriately. Possibilities are numerous and they lead to more frequent and smaller

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deliveries as well as proper use of available space, which are trends in the field of logistics. Crowdsourcing is one of the most important concept and involves crowd in realization of logistics activities.

Based on all of the above, it can be concluded that there is a great perspective on the development and application of this kind of service. This is also one of the main motives of this research. In this paper, the main focus of the research is identification and analysis of applied solutions in practice.

One of the possible solutions is crowdsourcing which is the subject of this paper. Essential characteristics of the concept are described in section 2, as well as types of crowdsourcing in section 3. There is also section 4 that deals with current situation in the world market through statistic analysis of crowdsourcing and shows the advantages of crowdsourcing through practical example of company that realizes processes using this concept.

2. PROBLEM DEFINITION

Crowdsourcing refers to involving ordinary people in the realization of logistics operations. It represents combination of two words: "crowd", meaning a mass of people, and "outsourcing", which describes the shift of certain processes and activities to third parties (Odongo, 2017). Implementation of crowdsourcing concept in logistics is recognized and defined as crowd logistics. This concept is based on network of connected people that use their spare time and/or space to help other people and earn money in return. That is enabled by using applications and platforms to find someone nearby that needs help or somebody that can do a service, depending on what one needs at the moment. Figure 1 illustrates how crowd logistics system works.

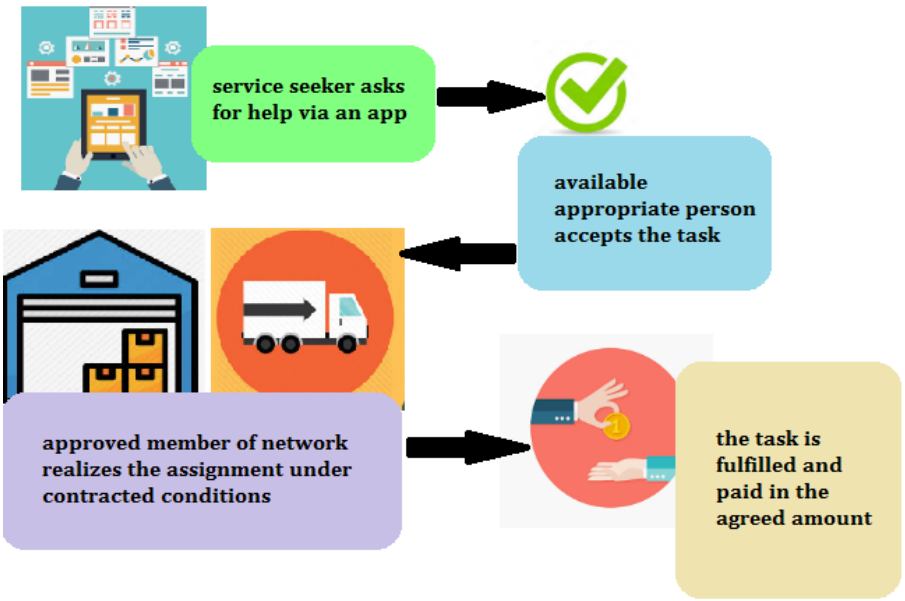

Figure 1. Crowdsourcing system

The most important part of crowdsourcing system are certainly people. The more effective network of connected people, the better and cheaper service and more satisfied clients are. That is possible only when there is an appropriate digital implementation that

enables fast reaction to all needs through utilization of smart devices and applications that are available to every member of crow logistics network (Rouges & Montreuil, 2014).

It is important to point out that crowd logistics systems are based on the will of people, and that it is up to them to decide whether they will fulfill certain task or not. There is no employment contract that forces them to participate in crowd logistics processes, they can stop being part of network at any moment. However, companies use different methods to motivate people to join their platform by highlighting certain advantages: environmental benefits, social ties, altruistic experiences etc. (Carbone, 2017).

The most significant effects of this concept are reflected in lower costs of logistics operations and better usage of people's time and available space. The goal is to create a network of symbiotic relationships by matching logistics assets and capabilities with logistics needs (Carbone, 2017). Some people get the opportunity to access services and products in an easier and faster way, at a lower price, while others use empty space they own to earn extra money. It's a win-win situation that makes all the participants of crowdsourcing network satisfied and that is what makes people want to join such initiative.

Crowd logistics also has certain impact on the environment, which can be positive or negative, depending on some important factors: transport behaviour (empty kilometers, packages taking order etc.), consolidation of package, crowd's modal choice (bicycle, delivery on foot etc.). Since processes are being realized by crowd and not by professionals, there is no need for huge amount of assets, which is also good side of this concept. The essential part of crowd logistics is that it implies usage of unutilized space instead of requiring more of it. That can also be important for logistics companies that could reduce costs and achieve better efficiency by hiring crowd (Rai, 2018).

Aside from good effects of crowd logistics and crowdsourcing in general, there can also come to certain problems depending on reliability of the crowd. It is important that people are able to fulfill the assignment they signed up for and that includes access to all needed resources.

3. TYPES OF CROWD LOGISTICS

There are several ways to engage crowd to fulfill certain assignments in order to help other people. The existing literature shows different ways to divide types of crowdsourcing. Some authors only recognize ways of moving goods from point A to point B by crowd when they talk about crowdsourcing, while others consider renting storage places too. This paper shows all the types of crowd logistics that have been noticed through the conducted research. On the basis of various divisions in existing literature, a new division has been created in this paper which, in the best possible way, systematizes all existing ways to sort the types of crowd logistics.

3.1 Local delivery service

This type of crowdsourcing needs an access to certain transport resources and logistic abilities that will enable crowd to deliver package at the required time to the required place. These resources can be: cars, vans, scooters, bicycles etc. or the task can be fulfilled on foot, depending on the size of package and the distance of destination. Local delivery service is significant in big cities where the movement of large number of people is

represented on daily basis. It offers fast and cheap delivery of different consumer goods, small packages and food from restaurants.

3.2 Crowdshipping

This type of crowdsourcing can be realized in two different ways. One way is to order goods from abroad at a lower price than in the country of residence or to order something that doesn't exist on the domestic market. That includes using certain platform to find a person that travels from country that product is from, to country one lives in. Other way is to find the driver of a particular vehicle with enough space and adequate characteristics for carrying certain package to pick it up from one location and move it to another that is on his route and can be in another country or even continent. Good side of this type of crowdsourcing is that both driver and service seeker are in win-win situation. Driver uses empty space in his vehicle and gets extra paid while service seeker gets his package at a lower price.

3.3 Crowd storage

In addition to transport services, storage services can also be crowdsourced. This type of crowdsourcing is realized by renting property resources of people, such as: basements, garages, rooms or yards. They can be reached via certain platforms for this kind of services, and as earlier described two types of crowdsourcing, this type also provides a win-win situation.

4. CURRENT SITUATION IN THE WORLD CROWDSOURCING MARKET

The main part of this paper consists of the conducted statistical research that illustrates current situation in the world crowdsourcing market. Tables 1,2 and 3 bellow consist of service providers that can currently be found, and some of their main characteristics.

The results presented represent a part of the conducted research, which included certain literature research: scientific papers, professional publications, websites of individual solutions. 73 companies were identified, of which 13 represent crowd storage group of solutions, 34 are from crowdshipping group, and there are 26 companies that provide local delivery service.

Figure 2 shows current situation in the world in terms of the development of crowd logistics. The concept is most prevalent in North America and Europe, primarily because on these continents there are countries that are the most developed when it comes to information technologies. Nevertheless, crowd logistics slowly expands on other parts of the world, bringing significant changes in the operations of different companies and the realization of logistics processes. Many companies have been developed and more of them appear every year. The subsections below are about those companies and their development through years.

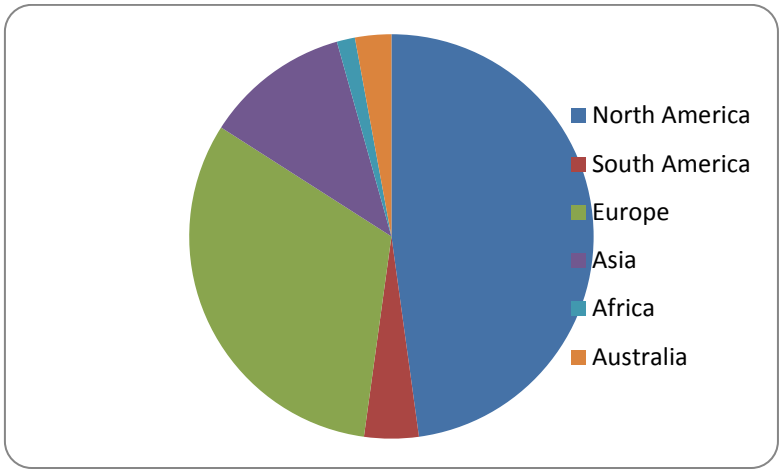

Figure 2. Development of crowd logistics in the world

4.1 Crowd storage solutions

Data from table 1 shows that crowd storage has evolved in the past decade, mostly in Europe. New service providers appear almost every year which shows that interest for this kind of services grows. Beside existing interest in crowd storage in Europe, it should be pointed out that in the past few years USA have also been developing this type of service. Other parts of the world haven't shown interest in crowd storage significantly yet.

Table 1. Crowd storage world market

Name	Founded	Founding place
MonsieurParking	2008	Paris, France
Costockage	2012	Paris, France
Storemates	2012	London, UK
Storenextdoor	2012	Bath, UK
Jestocke	2013	Paris, France
Spacer	2015	Pyrmont, Australia
Stasher	2015	London, UK
Stashbee	2016	London, UK
StoreAtMyHouse	2016	Los Angeles, CA,USA
Djeepo	2016	Amsterdam, The Netherlands
YesWeStock	2016	London, UK
Neighbor	2017	Lehi, Utah, USA
HopperStock	2017	Cleveland, Ohio, USA

4.2 Crowdshipping solutions

When it comes to crowdshipping situation is different. This type of crowdsourcing exists much longer than crowd storage and it's represented in many different parts of the world. Therefore it's easy to conclude that there are many more providers of this kind of service. Table 2 shows the most significant crowdshipping providers in the world market.

Table 2. Crowdshipping world market

Name	Founded	Founding place	Name	Founded	Founding place
uShip	2003	USA	Entrusters	2014	USA
Shiply	2008	UK	GOShare	2014	USA
Nimber	2010	Switzerland	Jwebi	2014	France
Bellhops	2011	USA	ShipBob	2014	USA
Bistip	2011	Indonesia	Parcl	2014	Australia
PiggyBee	2012	Belgium	Airmule	2015	USA
PleaseBringMe	2012	USA	BuddyExpress	2015	USA
TruckPad	2012	Brazil	Grabr	2015	USA
Worldcraze	2012	France	Point Pickup	2015	USA
Backapackbang	2013	USA	Qempo	2015	Peru
Cargomatic	2013	USA	BeckFriends	2016	India
Colis-Voiturage	2013	France	MyBoxMan	2016	France
GoGoVan	2013	Hong Kong	Ouibring	2016	Singapore
Manyship	2013	USA	AirWayBill	2017	Spain
Schelp	2013	USA	Outvio	2017	Spain
Sontra	2013	Brazil	Friendlivery	2018	France
Zaagel	2013	Egypt	Pigeon Express	2018	Belgium

Unlike crowd storage, crowdshipping is equally developed both in Europe and USA. They are leaders in crowdshipping world market, but this concept is also in progress in Asia, South America, Africa and Australia. It can be expected that development of crowdshipping will continue in all parts of the world because all the good sides of it are attracting more and more people to become part of such network.

4.3 Local delivery service solutions

Finally, local delivery service represents the most developed type of crowdsourcing, comparing to other two types. This kind of network spreads rapidly, mostly in large cities because of its advantages which were described earlier in this paper. Table 3 contains the most developed providers of local delivery service in the world.

Data in table 3 shows that nearly 60% of local delivery service contains of delivering food. A lot of crowdsourcing companies have contracts with different restaurants, so people can order food at any time. They can choose desired restaurant via an application so the first available appropriate person on network can realize the delivery at short time. The same applies to other types of packages that need to be delivered.

Table 3. Local delivery service

Name	Founded	Founding place	Current availability	Type of goods
Grubhub	2004	Chicago, IL, USA	1700+ cities in USA	food
Ele.me	2008	Bejing, China	2000+ China cities	food
Zomato	2008	Gurugram, Haryana, India	worldwide	food
OrderUp	2009	Baltimore, MD, USA	60+ cities in USA	food
Delivery Hero	2011	Berlin, Germany	worldwide	food
Postmates	2011	San Francisco, CA, USA	2900+ cities in USA, Mexico City in Mexico	different types of goods
Seamless	2011	New York City, NY, USA	USA	food
Caviar	2012	San Francisco, CA, USA	12 USA cities	food
Foodpanda	2012	Berlin, Germany	worldwide	food
Instacart	2012	San Francisco, CA, USA	USA and Canada	different types of goods
BuddyTruk	2013	Santa Monica, CA, USA	4 USA cities	furniture
Deliv	2013	Menlo Park, CA, USA	35 USA cities	different types of goods
Deliveroo	2013	London, UK	200 European cities	food
Dolly	2013	Seattle,WA, USA	5 USA cities	furniture
DoorDash	2013	Palo Alto, CA, USA	600+ USA cities	food
Favor Delivery	2013	Austin, TX	50+ cities in TX, USA	different types of goods
GoPuff	2013	Philadelphia, PN, USA	50+ USA cities	different types of goods
Kanga	2013	Atlanta, GA, USA	USA	different types of goods
LaLaMove	2013	Hong Kong	9 Asian countries	different types of goods
Saucey	2013	Chicago, IL, USA	5 USA cities	alcohol
Eaze	2014	San Francisco, CA, USA	100+ cities in CA, USA	medical cannabis
Lugg	2014	San Francisco, CA, USA	9 USA cities	furniture
Swiggy	2014	Bangalore, India	60 locations PAN India	food
Uber Eats	2014	San Francisco, CA, USA	worldwide	food
Dahmakan	2015	Kuala Lumpur, Malaysia	Kuala Lumpur, Bangkok	food
Wolt	2015	Helsinki, Finland	16 European countries	food

Another interesting fact is that all analysed providers have significantly made progress through years. Their business has spread to hundreds and thousands of cities, which only indicates that progress will continue. The US is definitely the leader when it comes to foundation of local delivery service providers with 65% participation, while other 35% were founded in Asia or Europe. It is also important to say that 15% of analysed providers do business worldwide, which can be seen in the table 3.

4.4 Comparative analysis of crowd logistics types

The conclusion is that crowd storage is the least developed type of crowdsourcing, while crowdshipping and local delivery service are developed worldwide. The graph below shows that crowd storage is the youngest and least developed type of crowd logistics. This indicates that the focus is on transport, and that it is easier to find a vehicle with extra space than a free storage space. It can also be seen that the most providers have been formed in the field of crowdshipping. The largest number of these providers had appeared between 2013 and 2015 - 55%, which means that crowdshipping experienced an expansion at that time. After that, although in smaller numbers, new companies have appeared every year in different parts of the world, which indicates that the concept has attracted a lot of people's attention and that in the future, it will only develop more and more.

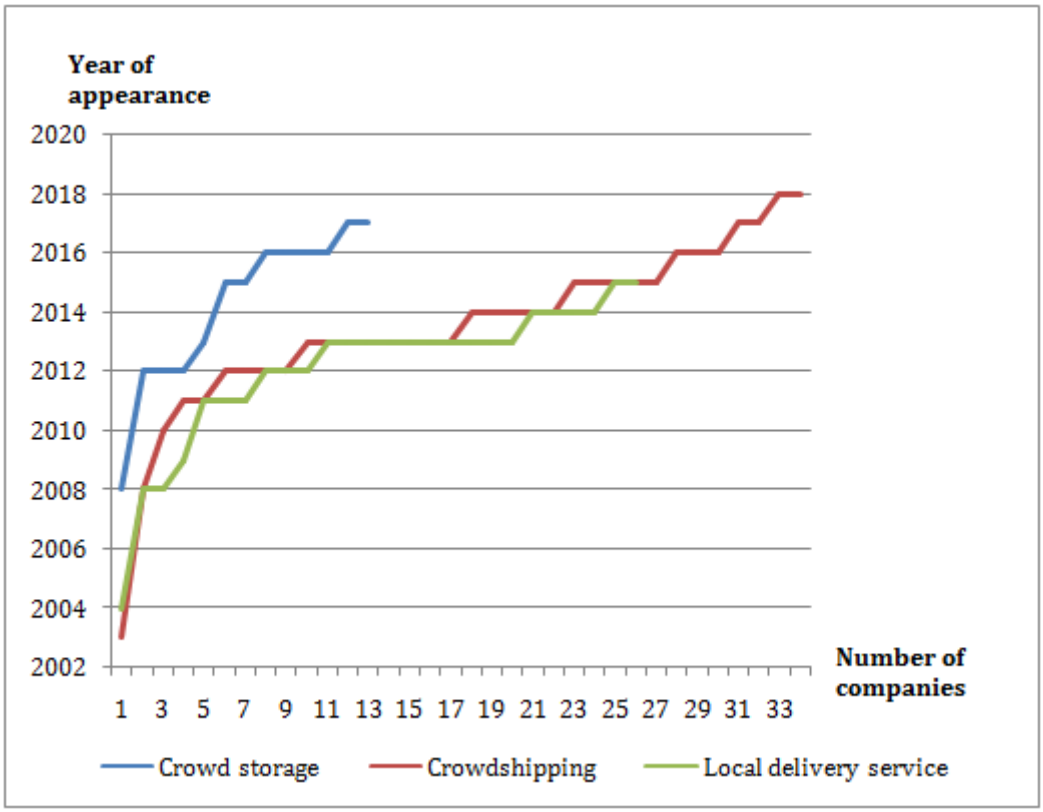

Figure 3. Development of types of crowd logistics through years

On the other hand, although there is a smaller number of local delivery service providers, it does not mean that this type of crowd logistics is less developed. On the contrary, the existing companies have developed and expanded to other cities for years, some of which have been developed in several thousand cities and in different countries too. The fact that there has not appeared a new significant company in recent years indicates only that already existing companies have strengthened and taken over the market. The largest number of providers came into existence in 2013, which, according to previous data on crowdshipping, indicates that crowd logistics was at the height of its development that year, in terms of the emergence of new companies.

Moreover, local delivery service requires a lot of people involved so the network would work because of frequency of processes, and it can be said that this is the most important and the most useful type of crowd logistics. That is because cities are getting bigger and more populated so the processes inside them are becoming more complex and harder to realize. Therefore, one well organized crowd logistics network could be acceptable local delivery service solution in cities.

4.5 WOLT - Local delivery service provider

Since it was concluded that local delivery service is very significant type of crowdsourcing, one provider from this area was chosen to be described, so reader would have wider picture about the concept itself. The chosen provider is Wolt and it operates in many cities and countries in Europe.

Wolt provides online ordering and delivery of food via mobile application. It started operations in 2015. and has since expanded into 15 countries across Europe. It will also soon begin operations in Belgrade. The company is partner with over 2,000 restaurants and allows each restaurant to subscribe to the network and receive the customer's order, paying for the delivery through crowdsourcing and automatic credit card payment. The user chooses a restaurant via the Wolt application and makes an order, after which is notified when it will be ready for delivery.

The order is made by first choosing the appropriate restaurant and the desired meal through the Wolt application. After the selection has been made, the order is confirmed, where it is possible to see in what time the delivery will take place. An additional advantage is that the user can monitor the delivery through the application. Figure 4 shows how Wolt application works.

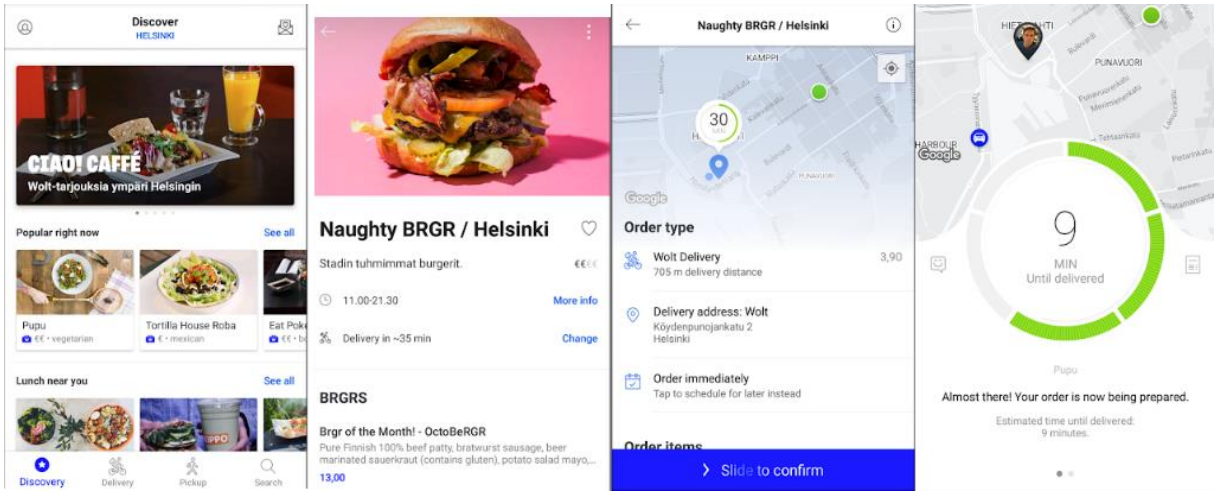

Figure 4. Wolt application (https://wolt.com)

In the background, the Wolt system paves the order with the available service provider. The driver takes over the order from the restaurant and delivers it to the user. It can be done on a bicycle, scooter, motor, car or on foot in some cases. According to Wolt's website, the company provides the following to the crowd: flexible working hours, payment for each completed delivery, a guarantee for a fixed schedule when the service provider prepares the working hours in advance, payments twice a month, weekly bonuses, work with the best restaurants in the city, part-time work.

5. CONCLUSION

Based on the topic that was discussed, it can be concluded that the concept of crowdsourcing has very positive effects, both on the business of companies and society at large. More efficient implementation of business processes is possible, as well as significant cost reduction through the minimization of necessary resources by engaging ordinary people. In this way, a winning situation for all members of the network is achieved, because the processes are done for everyone's benefit. Companies use less of their resources and are given a simpler organization, people get paid for a job they do at their discretion, users meet the requirements within the appropriate time limit, and the environment suffers less crowds and complications in traffic.

When it comes to Serbia, crowd logistics slowly evolves, which is shown in the practical example that was described in this paper. A large number of experts in the IT sector, as well as logistics market that is not negligible, contribute to the possibility that this concept will further develop and change the way of doing business in Serbia and its surroundings.

Crowd logistics is based on strong IT support that is constantly evolving, with new opportunities being constantly under consideration. In the future, it is certainly necessary to deal with these opportunities, as well as to extend this concept to different companies and activities, in order to optimize all processes that involve the movement of people and goods.

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