

As Marx (1987) inquires, do the advancements in technology correlate to advancements in humanity or to heightened sense of self-interest and materialism? In the tightly coupled thesis, one recent form of technological innovation, peer-to-peer service, is examined to determine its role in society. Peer-to-peer service, or also known as collaborative consumption, is a decentralized platform on which two individuals can directly interact with each other to fulfill their needs without any intermediation by a third party. The technical portion of the thesis leverages peer-to-peer service to tackle the existing problems and inefficiencies in the second-hand market on Grounds at the University of Virginia. In a period of two semesters, our team, which consists of two other Computer Science students, develops a marketplace platform on which U.Va. students, faculty, and staff can buy and sell used items such as school supplies and household goods. Ultimately, the endeavor seeks to empower the users and the consumers by providing an alternate option in the market that is more user-friendly. The tight coupling between the two takes the issue of user empowerment from the technical project and extends it to the STS research. Emanating from the impacts of peer-to-peer services on users and communities, the STS topic delves into the nature of peer-to-peer services to determine the meaningfulness of the technological advancement. Making use of peer-reviewed research papers and scholarly journal articles, the STS portion uncovers what are direct and indirect benefits of collaborative consumption. In addition, the research will delve into why users choose to participate in the service. Then, all of these factors will be taken into account to establish collaborative consumption's role in the society holistically. Finally, the adaptation of Carlson's Social Construction model is used to realize the relations between the engineer and relevant entities to maximize the benefits of peer-to-peer services.

## **FAILING TECHNOLOGY**

According to Nye (2006), industrialization aided by advancements in technology broke the bonds of communities and widened the gaps between social classes (p. 23). As such, the widely held view of technology is pessimistic. According to Adibifar (2016), a Sociology Professor at Metropolitan State University of Denver, prominent classical sociological theorists such as Karl Marx, George Simmel, Emile Durkheim, and Max Weber shared the view that technology leads to alienation and loss of relations with others (p.62). Before the rise of technology, people had more face-to-face social interactions, a stronger social bond, and shared the same social norms and values. Durkheim refer to this notion as collective consciousness. However, as further noted by MacIver (1950), Durkheim believed that collective consciousness will diminish as technology advances to eliminate social interactions all in the name of efficiency (p.84). To illustrate, ATM machines and online stores eradicated human interactions with tellers in banks, clerks in stores, and salespersons in malls. Consequently, advancements in digital technology correlate to increased cases of anxiety and depression among users (Hoge & Bickham & Cantor, 2017).

In America, technological progress has succeeded in providing products and services to fulfill humans' physiological needs, which include food, shelter, health, transportation, and clothing. Individuals can complete more tasks in less time, enhancing the overall efficiency in day to day tasks. Nevertheless, as briefed earlier and illustrated in Figure 1 on page 3, desire for efficiency often leads to eradication of social interactions. Rifkin (1980) denotes how the Machine Age in America stemmed from theologians, mathematicians, and scientists such as Bacon, Descartes, and Newton and their desire for understanding and control of nature (p. 19). In the Machine Age, self-interest sits at the core of all values and Locke and Smith believed that the

goal of increasing material well-being emanating from such a principle would lead to increased order. Complete order achieved through mathematics, science, and technology would lead to efficiency and harmony. These individuals' beliefs reflect the first three steps in Figure 1. But, the last two steps are disregarded.

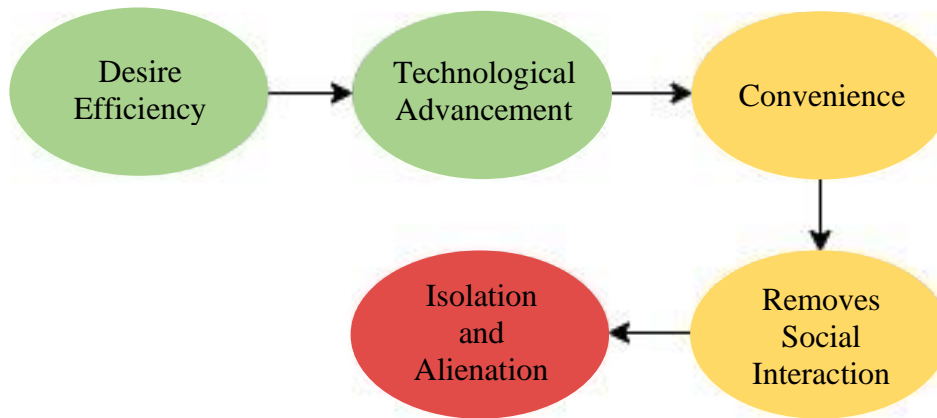


Figure 1: Technological Progress and Alienation: A desire for higher efficiency leads to a drive for technological advancement and while it is typically associated with improved efficiency and convenience, many times it leads to the removal of social interactions and more alienation (Choi & Workman, 2019)

To continue on the topic of values, when self-interest sits at the core, producers are inclined to create and sell more, often by creating new demands and persuading consumers. Between the producer and consumer, this method only benefits the producer. As noted by Lightman (2003), Charles Kettering, a major inventor and general at GM Research Labs, wrote in *Nation's Business* magazine that a business must create a dissatisfied customer and keep the customer dissatisfied (p. 299). Here, this notion implicates and purposely ignores the question of how inventions can meaningfully impact users. At the core of this ideology is creating new demands and increasing profits. It comes as no surprise that advancements in technology have provided quick and easy solutions, but have also stripped away empowerment from consumers, leading to decadence.

To further illustrate these implications of technological progress, humans can order a roll of paper towels and have it delivered to their front door in less than two days, have restaurant food delivered in less than an hour, and watch high definition movies without leaving the comfort of their own homes. In all of these situations, tasks, including entertainment, have been maximized in convenience and efficiency. However, the enabling technology strips away the social elements that were previously required. Consequently, the society is left disintegrated and individuals alienated. To quote Rifkin (1980), “by separating and then eliminating all of the qualities of life from the quantities of which they are a part, the architects of the machine paradigm [are] left with a cold, inert universe made up entirely of dead matter (p. 22).” Here, Rifkin states the trade-off between material wealth and non-material wealth. Although consumption may increase, it has no meaningful impact on the consumers anymore. However, this assertion does not conclude that all technology is evil. The responsibility of ensuring greater humanity lies in the architects of the machine age, or the engineers.

As believed by Benjamin Franklin, focusing on the goal of using technology as instruments for carrying out a comprehensive transformation of society can benefit all, not just private corporations (Marx, 1987). Technological progress can lead to efficiency that can transform the society. But, in order to bring about meaningful changes, the attention needs to be shifted from maximizing convenience to liberation and empowerment. Thus, studying technological models that can positively impact the users and society will raise awareness for responsible implementation of technology. Peer-to-peer services have demonstrated stimulating meaningful connections and changes. In the subsequent section, the thesis will delve into what are the reasons people participate in peer-to-peer services and how do these factors benefit the users and the community as a whole.

## **EMERGENCE OF PEER-TO-PEER SERVICES**

Peer-to-peer services have quickly gained popularity in the past decade. According to iPropertyManagement, Airbnb, which is one of the most prominent peer-to-peer services, has over 150 million users, 650,000 hosts, 6 million listings, and valuation of \$38 billion (2020). According to MuchNeeded, Uber, a ride-sharing peer-to-peer app, currently has 75 million riders, 3 million drivers, and valuation over \$72 billion (2020). Despite the growth of such dominating companies, much of the existing research is on peer-to-peer services on an organizational level. There is still not much research on peer-to-peer services on an individual and social level according to Lee, Chang, Balaji, and Chong (2018).

With emergence of these new peer-to-peer platforms, such as Uber, Airbnb, TaskRabbit, and Etsy, incumbent firms have lost some control in pricing. In addition, as noted by Byers, Proserpio, and Zervas (2017), these platforms have introduced a new demand that did not previously exist in the market, through the supplies of new products and services just as previous advancements in technology have. In the same study, which was selected as one of the eight finalists for the 2017 Paul. E. Green Award (Grewal, 2018), Byers, Proserpio, and Zervas discovered that each additional 10% increase in the size of the Airbnb market resulted in a .39% decrease in hotel room revenues in Texas. Consequently, the hotel room prices also decreased. According to Carpenter, who has been working and reporting as a journalist in the field of transportation for over a decade (2020), the Los Angeles Department of Transportation estimates that the taxi business is down 75% since 2012, when Uber was launched in the city. These numbers signify the magnitude in power of collaborative consumption technologies.

Nevertheless, peer-to-peer service technology should not be hastily deemed as the superior alternative to existing practices. As Carpenter comments (2020), the new ride-hailing apps are not mandated by law to serve those with physical disabilities, whereas existing taxi companies are. Therefore, although Uber and Lyft offer cheaper fares and convenience, taxi companies are better regulated and serve all individuals. Thus, in light of these developments of the new technology, peer-to-peer service need to be studied to determine its place and its role in the society. In order to determine whether peer-to-peer service presents the same downfalls of previous digital innovations, multiple facets of the nature of the technology must be considered. For example, what are some of the core building blocks of successful peer-to-peer services? What are some of the reasons people choose to participate in peer-to-peer services? How do these different factors, in conjunction, affect the people and the society as a whole? In the following section, such questions will be further researched and the findings will help answer whether collaborative consumption technologies can provide more than convenience and efficiency.

### **WHAT MAKES A SUCCESSFUL PEER-TO-PEER SERVICE?**

The essential building block of successful peer-to-peer service is trust. By directly connecting providers and consumers without any third-party intermediation, collaborative consumption technology practices a different business model than other technology-enabled companies. Rather than creating and selling products or services, collaborative consumption technology enables interactions and transactions to be carried out between two individuals. This notion is best summarized by Botsman, who was named a “Young Global Leader” by the World Economics Forum and was invited by TED to present her findings on the benefits of

collaborative consumption. According to Botsman (2012), at its core, collaborative consumption is about making meaningful connections and these connections enable users to rediscover a humanness through personal relationships afforded by trust rather than empty transactions. Thus, to determine the reasons for successful peer-to-peer services' magnitude and reach, the nature of the technology must be examined.

According to Stanford Professor Einav, Harvard Professor Farronato, and Dean Levin of Stanford Graduate School of Business (2016), an important aspect of building a peer-to-peer marketplace platform is the level of trust for each transaction to ensure positive experience and guard against low quality, misbehavior, and fraud (p. 616). Research carried out by Dongyu Chen, Fujun Lai, and Zhangxi Lin (2014) illustrates the importance of said trust as they found there to be positive correlation between the level of trust in the buyer's information and the seller's willingness to sell. Furthermore, to continue on the topic of trust and to help summarize, Lee, Chan, Chong, and Balaji (2018) clarified that perceived risks, perceived benefits, trust in the platform, and perceived platform qualities all had significant influence in users' proclivity to participate in the sharing economy. All three of these results share that trust is a key factor in the design and implementation of a peer-to-peer service. Ultimately, trust helps lower the barrier to entry, meaning more users will be inclined to go on the platform to sell and buy used items. This finding reveals that in order to encourage and facilitate interactions among users in the first place, the platform has to provide them with assurance that it is safe and reliable. To revisit the Machine Age, this notion of having trust at the core of a business model contrasts with the inventor and general at GM Research Labs mentioned earlier in the thesis. Notably, collaborative consumption strives to protect the users and keep them content, whereas corporations such as GM aim to instill a constant sense of lack and discontent in consumers. At its core, collaborative

consumption's intent is to bring people together by leveraging technology. However, other corporation's intent is merely to sell technology in a conniving manner.

## **WHY DO PEOPLE PARTICIPATE IN PEER-TO-PEER SERVICES?**

What is interesting about peer-to-peer services is that, as asserted by Hawlitschek, Teubner, and Gimpel (2018), consumers are motivated to participate for multiple, diverse sets of reasons: financial benefits, trust in other users, social experience, sense of belonging, modern lifestyle, and ecological sustainability. This finding reveals that the users of the system are not driven by pure self-interest, contradicting Locke's and Smith's theory of the Machine Age. Moreover, the users are interested in the wide reaching social and environmental impacts. For example, MamaBake is a peer-to-peer service that enables mothers of Australia to get together regularly to form a group, big batch cook, and share the meals. As researched and delineated by Rowe (2017), MamaBake promotes social cohesion by bringing the users together with the goal of reducing the workload while increasing social support within the community. Furthermore, MamaBake demonstrates the use of technology, peer-to-peer service, as a tool to drive social and cultural goals, rather than as a primary means to generate revenues and profits. Consequently, discerning the underlying motifs can help to discern the relationships among peer-to-peer services, users, and the society.

Peer-to-peer services, such as Etsy, have empowered individuals to create and sell, providing them with a low cost of entry to market, a community of supportive, like-minded individuals, and an easy way to communicate and complete transactions. During industrialization, skilled artisans who enjoyed creating finished products were subjugated to division of labor as increased efficiency in means of production led to de-skilling of work and



lowering of wages. Here, what collaborative consumption offers is empowerment in the forms of creative practice and financial support. Inevitably, this liberty affects users' level of fulfillment and sense of purpose.

According to Byers, Proserpio, and Zervas (2017), Airbnb's ability to flexibly scale instantaneous supply has significantly impacted the hotels and reduced their control of prices during periods of peak demand. This demonstrates empowerment of individuals in the form of influencing prices. Previously, individuals had no influence on the room prices, as the hotels solely determined them based on supply and demand in different seasons. However, the alternative housing options that Airbnb, or its users, provide have enabled users to set the prices, which in turn have forced the hotels to take into consideration in price setting. Furthermore, it is noteworthy that the resulting decrease in hotel room prices from increase in size of Airbnb market benefits not only the users, but all consumers. Those who are not a part of Airbnb can still reap the benefit of cheaper hotel room prices as a result of increased options and competition. This finding reveals that participation in collaborative consumption has wide reaching impacts on all individuals within a society.

As mentioned by Marx (1987), new technology should further consider the meaning and implications of technological progress to better understand its necessity in context. More specifically, how should the engineer shape the design of technology to respond to the needs, wishes, and goals of other social groups. The use and impacts of peer-to-peer services can best be illustrated through the adaptation of Carlson’s Social Construction model. Figure 2 below demonstrates the social construction of technology regarding what are some of the factors the engineer must consider to

satisfy the concerns and needs of the environment, society, government, and people. First, from an environmental stand point, the engineer must realize the goals of reducing waste by reusing or sharing. Socially and culturally, the engineer must keep in mind that the peer-to-peer service should aim to improve the society by

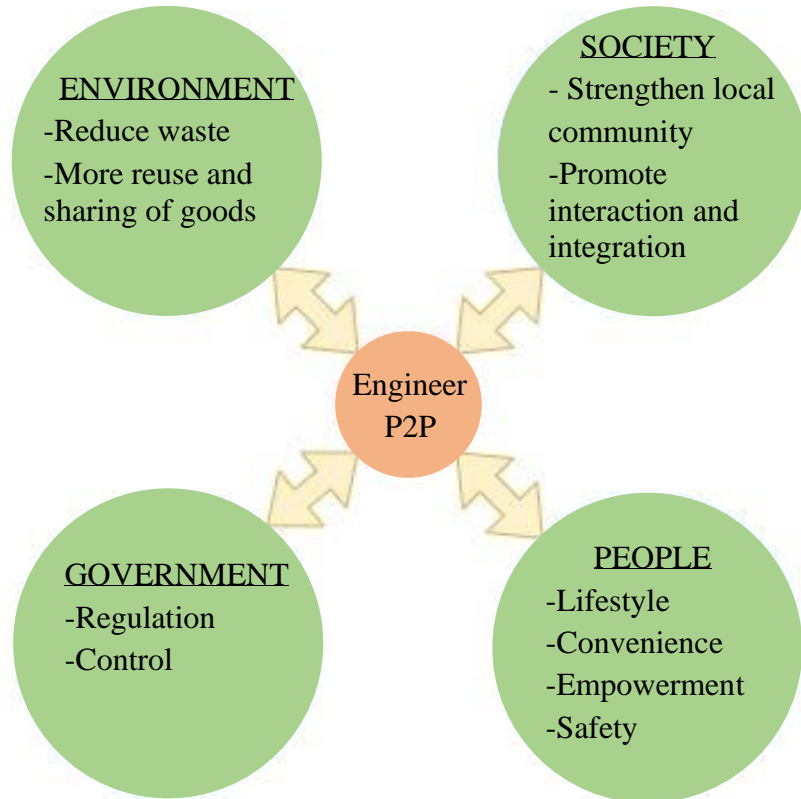


Figure 2: Peer to peer marketplace SCOT model: The Engineer in the center of the social construction must balance the interests of each group involved (Choi & Workman, 2019).

strengthening local communities. This challenge is closely related to the goal of empowering users and facilitating positive interactions. Then, enhancing the usability of the service can lead to social cohesion, for which the engineer must implement functional and nonfunctional

requirements to satisfy user's needs. As delineated, the design and implementation of a successful peer-to-peer service requires consideration of relevant entities.

## **PROMISING TECHNOLOGY**

Peer-to-peer services have the power to empower regular individuals. As denoted by Prabhat (2018), services that create new kinds of connections within societies lead to sharing of common virtues. Given that the primary goal of peer-to-peer service is facilitating connections between individuals, the technology has the potential to elicit sharing of common values among the users. The interaction and the community collaborative consumption provides stimulate and fortify social aptitude. Furthermore, peer-to-peer services cannot function properly and successfully if the element of trust is not engrained within the platform and service. Thus, by connecting different individuals to fulfill eachothers' needs, collaborative consumption not only spreads trust, but also other values embedded within the product or service. In addition, Stanley (2003) asserts that a cohesive community exemplifies shared values (p. 5). Therefore, peer-to-peer services have the potential to bring back cohesion and social integration within communities.

Although collaborative consumption presents a number of said benefits, it is too premature to determine its role within the society. The flexible nature of peer-to-peer services require the engineers to interact with different stakeholders to understand their needs and concerns. Without such considerations, collaborative consumptions could fall into the same downfall of previous technological advancements and cause disintegration and alienation. Thus, engineers must be aware of the numerous liberal reasons consumers choose to participate in peer-to-peer services and try to foster a sense of community and safety. In addition, in order to

compare collaborative consumption's impact and inclusivity to those of existing technology, much more research and case studies need to be carried out. For example, how do their impacts on incumbent firms affect different stakeholders? Research into this space can shed light on how to better regulate the technology to stimulate the positives while mitigating shortcomings.

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# **COLLABORATIVE CONSUMPTION, SOCIAL COHESION, AND EMPOWERMENT**

A Research Paper submitted to the Department of Engineering and Society  
In Partial Fulfillment of the Requirements for the Degree  
Bachelor of Science in Computer Science

By

Johnny Choi

March 27, 2020

On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

ADVISOR

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