ANALYZING THE ABILITY OF DISHWASHER MANUFACTURERS TO UNDERSTAND AND ACCOMMODATE CONSUMER PERSPECTIVES

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By

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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.

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INTERACTION BETWEEN CONSUMER DEMANDS AND DISHWASHER FUNCTIONALITY

Mass production and the widespread availability of electricity are what initially enabled the average American household to obtain time-saving appliances such as the dishwasher (Cowan, 1983, pp. 93-101). The invention of the dishwasher decreased the amount of time people spent doing their dishes, because of the switch from hand-washing to automation. Over time, dishwashers have become an integral part of most American households. A survey done by the U. S. Energy Information Administration (EIA) found that three out of four American households own a dishwasher (McNary, n.d.).

The popularity and widespread adoption of artificial intelligence and the Internet of Things (IoT) altered the way that people live their daily lives ("IoT has quietly and quickly changed our lives," 2019). Users expect that household appliances should adapt to each user's necessities within a timely manner, through an intuitive user interface. To keep up with the latest technological developments, dishwasher manufacturing companies have produced a variety of dishwashers equipped with smart sensors and IoT technologies, including automatic detergent dispensers. The technical project will be divided into two phases: discovery and research in the first-semester, and concept development in the second-semester. At the conclusion of the technical project, we intend to provide a list of key functionalities for the next-generation dishwasher.

As technology becomes integrated into everyday lives, there are numerous requests from consumers for technology to accommodate their individual needs. However, there are currently many discrepancies between consumer expectations and dishwasher capabilities. The focus of the STS topic is to examine consumer perceptions of dishwashers and the ability of

dishwasher manufacturers to understand consumers. The interaction between manufacturers and consumers will be identified through reviewing previous research studies and information from top-rated dishwasher companies. After my research, the goal is to produce a research article assessing the progression of consumer demands and dishwasher functionality. This STS topic will highlight the capabilities and analyze the failures of the improvements that dishwasher companies have attempted to implement, as well as analyze the patterns of consumer expectations through the Social Construction of Technology (SCOT) approach (Pinch & Bijker, 1984, pp. 399–441). A SCOT approach, shown in Figure 2 on page 5, enables a full grasp of the relationships between the relevant social groups and their impacts on the next-generation dishwasher appliance.

This STS project, completed under the guidance of Professor Catherine Baritaud in the Department of Engineering and Society, will compare various consumer studies on dishwasher perception and daily habits within the United States to determine the ability of dishwasher manufacturers to accommodate consumers' expectations. The technical and STS topics are tightly coupled because the STS research will provide insight on common trends in consumer demands and the challenges that manufacturers face when addressing these requests. An enhanced understanding of the relationship between the consumer and manufacturer from my STS topic will enable me to determine a list of the appropriate sensors necessary for the design of the next-generation dishwasher in my technical project.

FAILURES OF DISHWASHER MANUFACTURERS

The first dishwasher, patented in 1850, was considered a failure because it was inefficient and failed to properly clean the dishes ("History of Dishwashers," 2017). The drying feature, which is an essential function for sanitation and a feature of every dishwasher today, was not a

component of dishwashers until the 1940s ("How the dishwasher has changed our world," 2018). Current dishwasher designs are the result of decades of design iterations to optimize cleaning while minimizing effort. 21st-century dishwasher manufacturers have shifted their focus to improving usability, but users have expressed that their dishwashers occasionally fail to fulfill their expectations.

Data collected from 79.7 million U.S. households by the U.S. Energy Information Administration provides the information for the visualization, shown in Figure 1, of the breakdown of household appliance ownership and usage (McNary, n.d.). The study found that around 68% of American households own a dishwasher, but about 20% of dishwasher owners did not use their appliance in 2015 (McNary, n.d.). Figure 1, on page 4, highlights that dishwashers have the highest proportion of consumers that own the appliance, but do not use it. Surprisingly, residents in apartment buildings with five or more units contributed to 25% of dishwasher owners that do not use the appliance (Berry, 2017). These statistics reflect the failure of the current dishwasher design to accommodate consumer desires. Therefore, the divergence between consumer demands and dishwasher functionality needs to be analyzed, to provide manufacturers with a better understanding of the consumer's technological perspective.

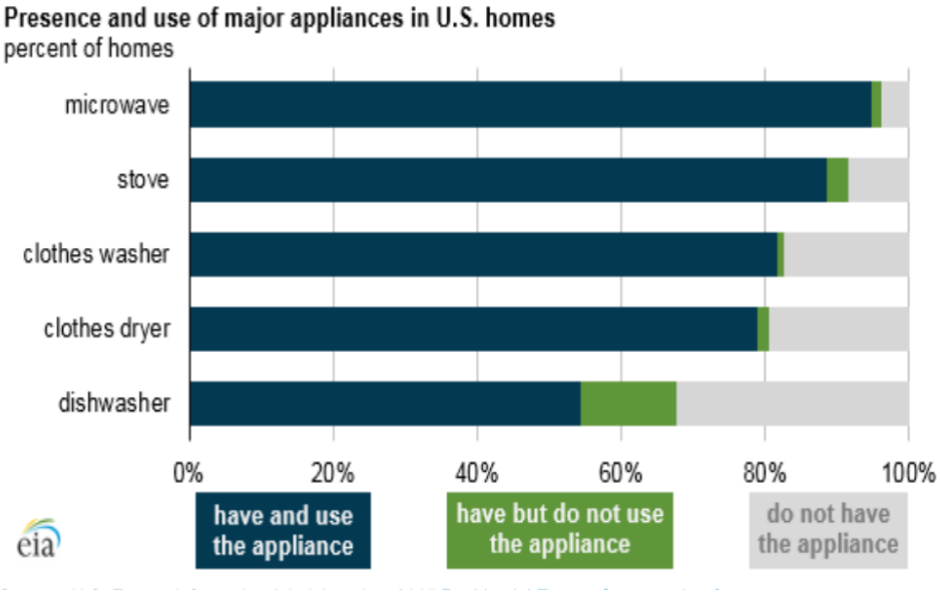

Figure 1: Segmented Bar Plot of Household Appliances. Visualization from U.S. Energy Information Administration household appliance usage and ownership survey results (McNary, n.d.).

Not every attempt to implement improvements to the dishwasher is successful. According to the United States Consumer Product Safety Commission (CSPC), at least 21 dishwasher models have been recalled since 1993 due to fire hazard concerns ("Recall List," n.d.). Whirlpool recalled 1.7 million dishwashers in 2010 due to an electrical failure in the heating component, which resulted in 12 house fires (Wolf, 2010, p. 72). Even highly-rated and reputable companies like Bosch and Siemens had to recall 476,500 dishwashers in 2009 because of 51 incidents and 30 fires that caused property damage ("Bosch and Siemens model dishwashers recalled by BSH home appliances corporation due to fire hazard," 2017). Recently, in 2019, ASKO recalled their dishwashers because of a power cord overheating issue that can lead to a fire hazard ("ASKO recalls dishwashers due to fire hazard," 2019). Shockingly, within the last 28 years, there have been recurring and unresolved issues with fire hazards within the process of using the dishwasher. As shown by the Whirlpool, Bosch and Siemens, and ASKO recalls, dishwasher manufacturers have failed to address the flaws in their quality control check system and as a

result, have endangered consumers. Rushing to meet consumer demands within a competitive market, without proper testing, can fail and ultimately hinder the reputability of the company.

As shown in Figure 2, the next-generation dishwasher must consider four key actors: technology, regulation, consumers, and manufacturers. To ensure the success of the next-generation dishwasher through SCOT, the manufacturers must be able to effectively integrate technology that will facilitate consumer satisfaction while meeting all governmental regulations. The level of success of the next generation dishwasher is contingent upon the ability to optimize these interactions between the four primary actors.

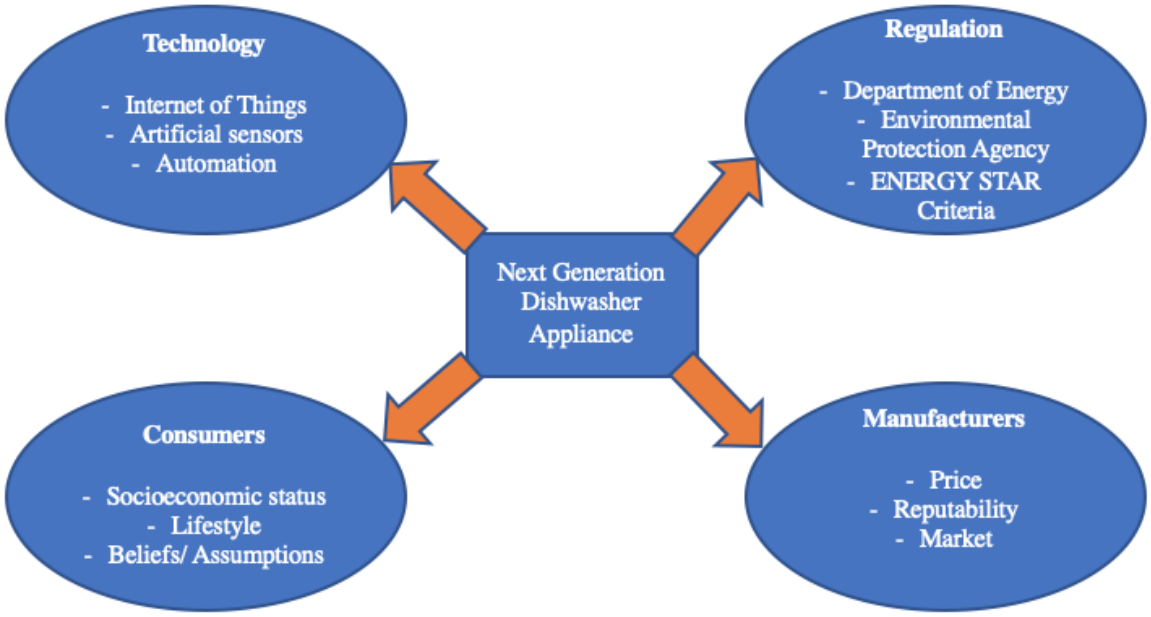

Figure 2: Dishwasher appliance SCOT model. A successful design of the next-generation dishwasher is dependent on the ability to balance these four key actors (Kyaw, 2020).

DISPARITY BETWEEN CONSUMER ASSUMPTIONS AND PRODUCTS

Some consumers' expectations for dishwasher performance are based on misconceptions. Figure 3 features the results of a study performed by the University of Bonn and provides insight into the public's understanding of resource consumption and cleanliness for handwashing versus dishwashers. As shown in Figure 3, 37% of participants believed that

manual dishwashing saves more energy and water and 39% of participants thought it would provide better cleaning results (Berkholz et al., 2011, p. 54). Similarly, an earlier research study by Berkholz et al. (2010) revealed that the primary factor for consumers not purchasing a dishwasher is due to 75% of participants in the study sharing the assumption that automatic dishwashers require more energy and water than handwashing (p. 240).

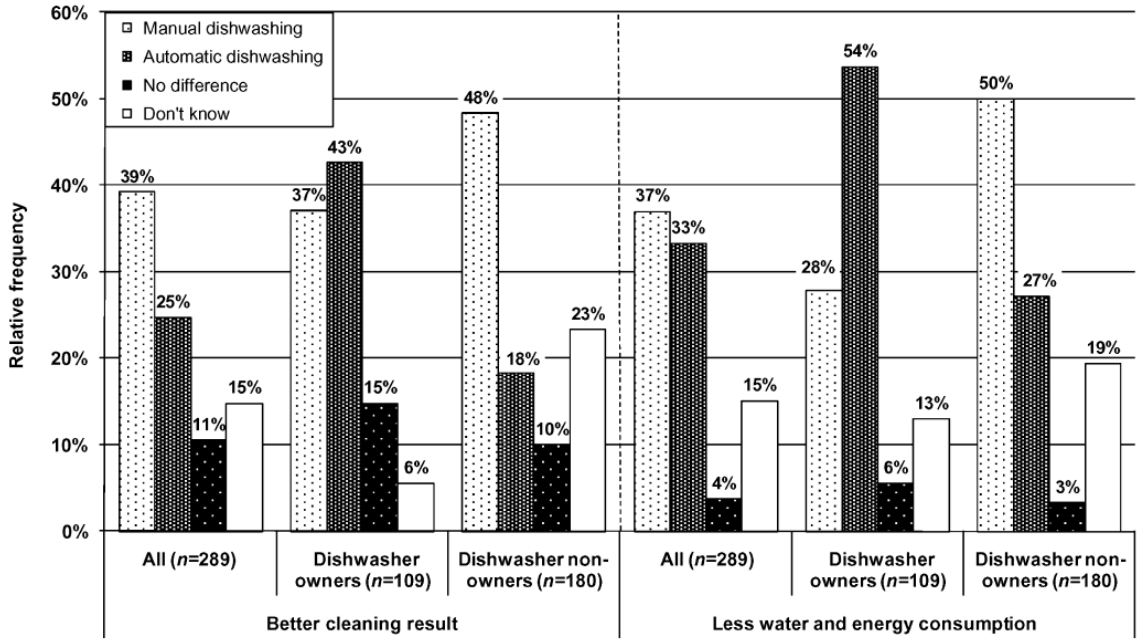

Figure 3: Bar Graph of Consumer Perceptions of Dishwashers. Graphical comparison of consumer beliefs on resource consumption and cleanness of dishwashers versus manual washing (Berkholz et al., 2011, p. 54).

The findings from Berkholz's studies were also supported by a national survey performed for Bosch by Impulse Reach, which determined two major consumer misconceptions about dishwashers: they are the loudest item in the house and require more water than hand washing (Wolf, 2011, p. 64). The finding that dishwasher resource consumption was perceived to be higher than that of handwashing was consistent in both the University of Bonn studies and the Impulse Reach national survey.

In reality, manual dishwashing is less sanitary and requires more energy and water than a dishwasher. The study by Berkholz et al. (2011) found that all dishwashing machines only require between 9.6 L and 26.7 L of water per cycle while manual dishwashing ranged from 34.7 L to 160.1 L. Ultimately, this study concluded that dishwashers were the superior choice because they deliver clean dishes with fewer resources (Berkholz et al., 2010, pp. 46-51). From an environmental aspect, as shown in Figure 4, handwashing emits 113 kg more greenhouse gases per year than an automatic dishwasher, which is equivalent to about 13 gallons of gasoline used when driving a car (Binstock et al., 2013, p. 10). Additionally, most dishwashers today exceed consumer expectations and kill 99.9% of germs through high-temperature cleaning, up to 158 degrees Fahrenheit ("Four reasons why you should use a dishwasher," n.d.).

Total GHG Emissions (kg)	Per Dish (dinner dish)	Per Load (12 settings)	Per Year (300 Loads per Year)
HW	0.0102	1.47	440.21
DW	0.0076	1.09	327.26

Figure 4: Greenhouse Gas Emissions Between Handwashing (HW) and Dishwashing (DW). Table of the total greenhouse emissions, in kilograms, between HW and dishwasher DW (Binstock et al., 2013, p. 10).

According to studies performed by Bosch (n.d.), dishwashers not only save time, they also eliminate harmful bacteria such as *E. coli* and *Salmonella* through high-temperature antibacterial cleaning techniques that cannot be achieved through handwashing ("Four reasons why you should use a dishwasher," n.d.). *E. coli* and *Salmonella* can cause food poisoning, kidney failure, and even death, so it is critical to consumers that the dishwashing processes eliminates these types of bacteria ("What is the difference between Salmonella and E. coli?", 2015). Consumers instill a level of trust in their dishwashers to efficiently complete a commonly dreaded household chore while providing a level of sanitation that cannot be achieved through handwashing.

IMPACT OF MISCONCEPTIONS ON CONSUMER USAGE BEHAVIORS

The lack of consumer confidence and knowledge of dishwasher capabilities results in unnecessary behaviors such as pre-rinsing dishes. A preconceived notion is that handwashing cleans dishes better than an automatic dishwasher, mentioned previously in the Berkholz et al. (2010) study and Impulse Reach Survey. This notion leads to users assuming that rinsing dishes prior to putting them in the dishwasher is a necessary action so that the dishwasher can achieve their desired level of cleanliness. Dupont (2012) performed a study on 500 American consumers about their dishwashing habits. 80% of the 500 consumers in the study owned a dishwasher, but, surprisingly, 75% of dishwasher owners pre-rinsed their dishes before loading them in the dishwasher ("US consumer dishwashing study," 2012). The top three reasons for pre-rinsing are: 63% stated that food particles get stuck, 33% thought that the machine would not clean them enough, and 31% perform the behavior because it was the way that they were taught ("US consumer dishwashing study," 2012).

These misunderstandings about dishwasher functionality result in suboptimal consumer behavior and waste resources. According to Benckiser (2020), a single pre-rinsing session can waste up to 20 gallons of water and provides no additional advantage in overall dish cleanliness (n.p.p). If Americans were to stop pre-rinsing, each household would save 2,995 gallons of water. In total, the U.S. would save 150 billion gallons of water per year. 150 billion gallons of water is enough to supply water to all of Los Angeles for over a year and is equivalent to the amount of water that runs through Niagara Falls in two days. Saving water is extremely important because 40 out of the 50 U.S. states may face a drought within the next 20 years, and it is predicted that by 2062 the water supply will be reduced by a third (Benckiser, 2020).

Cycle selection is another aspect where users fail to optimize their dishwasher functionality due to a lack of knowledge and incorrect assumptions about dishwasher cycle capabilities. Richter's (2011) consumer habits research found that most dishwasher users select the same program every time and 52% of users select higher temperature cycles, around 165 °F. This extent of high-temperature cleaning is not always necessary due to varying amounts of soil in each load. The constant usage of high-temperature cycles results in higher energy usage than stated on the dishwasher's energy label (Richter, 2011).

Another inefficient behavior observed by Richter (2011) is that the user does not optimize use of the space available within the dishwashers. Research showed that 20% of dishwasher racks are only slightly filled, so 40% or more of the space available was left empty. In other words, users could save eversy tenth dishwasher cycle if they were to run their dishwashers with full loads (Richter, 2011). Yet again, the motivation behind this inefficient behavior could be due to distrust in the dishwasher's ability to clean a full load of dishes.

INVESTIGATING THE SUCCESS OF DISHWASHER MANUFACTURERS IN UNDERSTANDING CONSUMERS

As illustrated by the studies cited previously, there is a discrepancy between consumer knowledge and the true operational capabilities of dishwashers. Key consumer and usage patterns can be identified by contextualizing dishwasher data. This data will aid in analyzing the effectiveness of various dishwasher manufacturers to adapt to these demands.

To combat the misconceptions of sound level and water usage found by the Impulse Reach research, companies such as Bosch have designed dishwashers that attempt to address consumer misunderstandings of the appliance. Shortly after completion of the Impulse Reach survey, the Bosch 800 plus dishwasher was released (Wolf, 2011, p. 64). This dishwasher was

virtually silent, at 39 decibels, due to 18 sound-reducing technologies (Wolf, 2011, p. 64). Bosch's rapid response to address consumer misconceptions by creating a new, virtually silent appliance demonstrates the extent of influence that consumers have on dishwasher design.

The two most important reasons that consumers use a dishwasher, beyond the time-saving component, are for hygienic aspects and the ability to wash loads of various sizes (Berkholz et al., 2011, p. 51). Research results by Dupont (2012) have shown that dishwasher manufacturers have failed in meeting the primary motives for purchasing their products because the most common issue experienced by 54% of dishwasher owners is that their dishes don't get clean enough and only 26% of dishwasher owners reported no problems with their dishwashers **(**"US consumer dishwashing study," 2012**)**.

Figure 5 on page 11 provides a percentage breakdown of why consumers do not own a dishwasher (Berkholz et al., 2010, p. 240). A high percentage of respondents stated that it was because they do not mind washing their dishes by hand, do not believe that they produce enough dishes, and believe that dishwashers consume too much water and power. In 2007, Bosch attempted to accommodate users with smaller loads by releasing their Integra Dishwashers which featured a load sensor for cycle customization and reduced energy consumption through a Half Load feature ("Bosch Bows New Evolution, Integra Dishwashers," 2007, p. 71). Similarly, Fisher and Paykel created the DishDrawer that allows users to run two independent loads at different times ("History of Dishwashers," 2017). The misconceptions that dishwashers use more energy and water, highlighted in the previous section, are reflected in Figure 5.

Reasons for not getting a dishwasher	Answers (%)
Not enough dirty dishes	54
Buy and use is too expensive	33
Dishwasher does not clean as well as washing up by hand.	15
Dishwasher uses more energy	40
Dishwasher uses more water	35
Not enough space for a dishwasher	47
Current living situation/no opportunity	16
Do not mind washing up by hand	59

Figure 5: Consumer Rationale for not Owning a Dishwasher and the Percentage of Responses. Table of the four main reasons why consumers do not purchase a dishwasher with a percentage breakdown of other justifications for not buying a dishwasher (Berkholz et al., 2010, p. 240).

Dishwasher manufacturers have attempted to address consumer concerns about dishwasher energy and water usage by producing products that meet ENERGY STAR criteria. ENERGY STAR qualifications state that the standard dishwasher has to have more than eight place settings and six serving pieces, use less than 270 kWh per year, and use less than 3.5 gallons per cycle ("ENERGY STAR program requirements for dishwashers," 2008). The EIA found that 84% of dishwasher models distributed in 2015 fulfilled ENERGY STAR criteria (McNary, n.d.). Each ENERGY STAR-qualified dishwasher displays a standardized label on the product, literature, and sometimes packaging. Figure 6, on page 12, shows that dishwashers have consistently been an appliance with the highest rates of ENERGY STAR qualification, yet consumers still uphold the assumption that dishwashers use a large amount of energy and water.

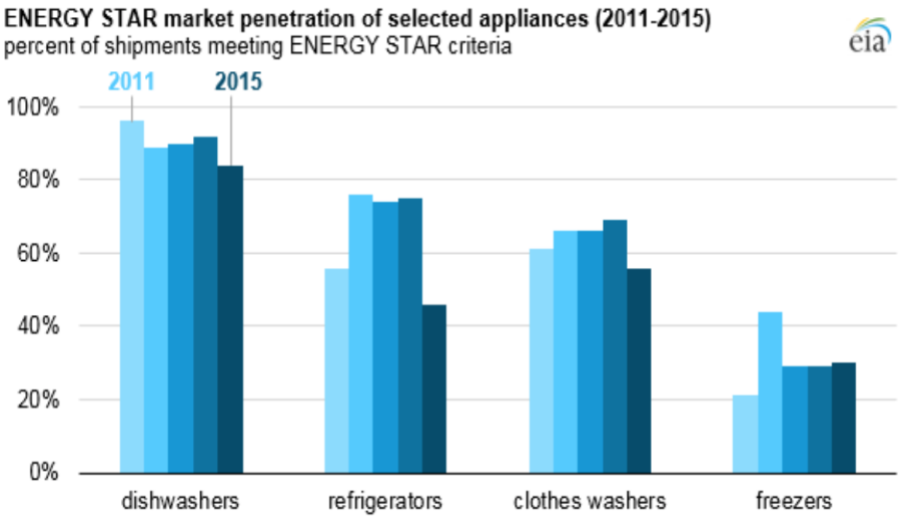

Figure 6: Bar Pot of Percentage of Appliances Meeting ENERGY STAR Criteria. Graphical display of the percentage of household appliance shipments fulfilling ENREGY STAR criteria from 2011 to 2015 (McNary, n.d.).

Consumer understanding of the ENERGY STAR label does not appear to be a contributing factor for consumer assumptions. In 2019, 74% of households had a high understanding of the ENERGY STAR label and over 82% had at least a general understanding of the label ("ENERGY STAR awareness," 2020). However, if there is a high understanding of the ENERGY STAR label, then the lack of resource consumption information cannot be the source of disconnect between consumers and dishwasher manufacturers.

New generations of dishwashers appear to be unsuccessful in accommodating consumer requirements. The statistics from Figure 3 and Figure 5 on pages 6 and 10 show how dishwasher manufacturers, such as Bosch, failed to produce products that convinced consumers that dishwashers decreased their overall water and energy consumption. It is difficult to pinpoint the source of consumer misunderstandings about dishwashers. There could be multiple sources of confusion, like lack of product transparency and the inability of dishwasher manufacturers to effectively monitor consumer perspectives.

MONITORING CONSUMER FEEDBACK AND ENHANCING TECHNOLOGICAL TRANSPARENCY

As technological capabilities rapidly advance, dishwasher manufacturers must understand the needs and desires of their consumer market. Therefore, an understanding of consumer trends must be achieved to successfully design the next-generation dishwasher that reinforces the consumers' daily aspirations. There is already an accessible, massive online platform that contains consumer data and opinions, also known as online reviews. Consumer reviews enable dishwasher manufacturers to monitor consumer viewpoints about their products and improve consumers' technological competence.

Due to the dramatic spike in technology usage and reliance in the 2010s, consumers started to use online reviews as a source of reliable information that would inform them about a product or service. Online reviews provide a medium for the dishwasher industry to apply demand-side, also known as consumer, feedback to adjust their production standards to fulfill consumer expectations. A study found that 70% of consumers trust online reviews, and it was ranked the second most trusted source behind friends and family (Nielsen, 2012, p.1). Studies by Horrigan (2008) and Lipsman (2007) found that out of over 2000 American adults, 81% of Internet users have researched an item online at least once, 20% monitor online postings every day, 73-87% stated that online reviews have a significant impact on their purchasing behaviors, and that consumers are willing to pay between 20-90% more for a 5-star rated product than a 4-star rated product (Horrigan, 2008; Lipsman, 2007). These statistics show that online consumer reviews are a highly used source of information by consumers and contribute to their purchasing patterns or knowledge about a product.

Creation of Automatic Searches and New Consumer Dictionaries

An automated system is now necessary to filter through online reviews to accommodate this shift in consumer behavior. However, previous methods of automation failed to incorporate product category-specific performance expectations and were limited to a simple single word, unigram, list for defect discovery. A study by the Virginia Polytechnic Institute and State University created multiple new domain-specific dictionaries that would identify defects in the dishwasher industry and compare its performance to existing sentiment dictionaries like Harvard General Inquirer's Negative word list, AFINN Sentiment Analysis, and Affective Norms for English Words (ANEW) (Law et al., 2017, p. 87).

When Law et al. (2017) compared Harvard General Inquirer's Negative word list, AFINN, and ANEW, it was determined that only AFINN's sentiment analysis was able to accurately detect product defects from online reviews. The other two sentiment dictionaries were outperformed by the unigram, bigram, and trigram custom domain specific negative words, called smoke word dictionaries. Ultimately, the smoke-trigram dictionary was the most effective smoke word dictionary because it contained more non-emotional words which lead to a higher rate of defect discovery. Additionally, a new class of words, Sparkle, was an effective method of capturing consumer satisfaction with the product and their ability to effectively operate the machine (Law et al., 2017, pp. 85 - 91).

Online reviews are shaping consumer behavior and determining the societal reputation of brands. Other major consumer markets such as automotive and toy companies have already started using their domain-specific dictionaries to monitor consumer options (Law et al., 2017, p. 84). By implementing a domain-specific dictionary to examine consumer satisfaction, the dishwasher industry will effectively detect defects or misconceptions to allow rapid, continuous

product improvements. To keep up with consumer demands and the competitive consumer market, it is critical that dishwasher manufacturers create custom defect detection dictionaries and closely monitor their consumer reviews.

Recommendations for User Manuals

Information debunking dishwasher misconceptions and best practices for optimal results exist, but dishwasher manufacturers have failed to make these resources accessible for the consumer. For example, in a 50-page long BOSCH instruction manual, the tips for best dishwasher loading practices started on the eighteenth page ("Dishwasher SHSM63, SHS863, SHS843, SHVM63, SHV863," n.d., pp. 18 -19). The BOSCH instruction manual includes multiple helpful images, as shown in Figures 7 and 8, but nothing draws attention to important information such as "Do not pre-wash items with loosely attached food soil" ("Dishwasher SHSM63, SHS863, SHS843, SHVM63, SHV863," n.d., pp. 18 -19).

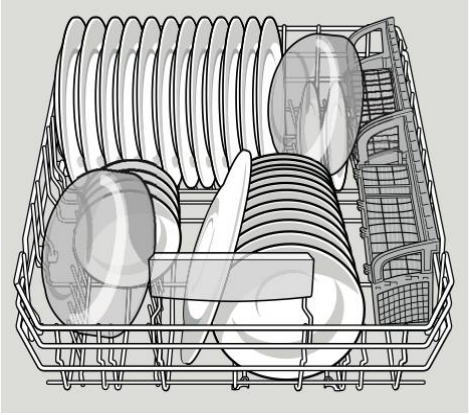

Figure 7: BOSCH Suggested Loading Pattern for the Lower Rack. Visual display of the suggested bottom rack loading pattern for a 12-place setting ("Dishwasher SHSM63, SHS863, SHS843, SHVM63, SHV863" n.d., p. 18).

Figure 8: BOSCH Suggested Loading Pattern for the Upper Rack. Visual display of the suggested top rack loading pattern for a 12-place setting with a third rack cutlery drawer ("Dishwasher SHSM63, SHS863, SHS843, SHVM63, SHV863" n.d., p. 19).

Today, consumers usually do not read the instruction manual included in their products due to laziness, not having enough time, or because the manual is poorly written (Stum, 2018). Results from an end-user study conducted by the University of Maryland determined that only 2.7% of participants consulted the instruction manual to resolve the issues they were facing (Ceaparu et al., 2002). Similarly, another study shown in Figure 9 found that zero percent of participants consulted the manual as a resource (Mendoza & Novick, 2005). The method with the highest percentage for solving a technological issue was to ask someone else for help (Mendoza & Novick, 2005). It is critical for dishwasher manufacturers to improve upon an outdated medium of lengthy paper manuals for information.

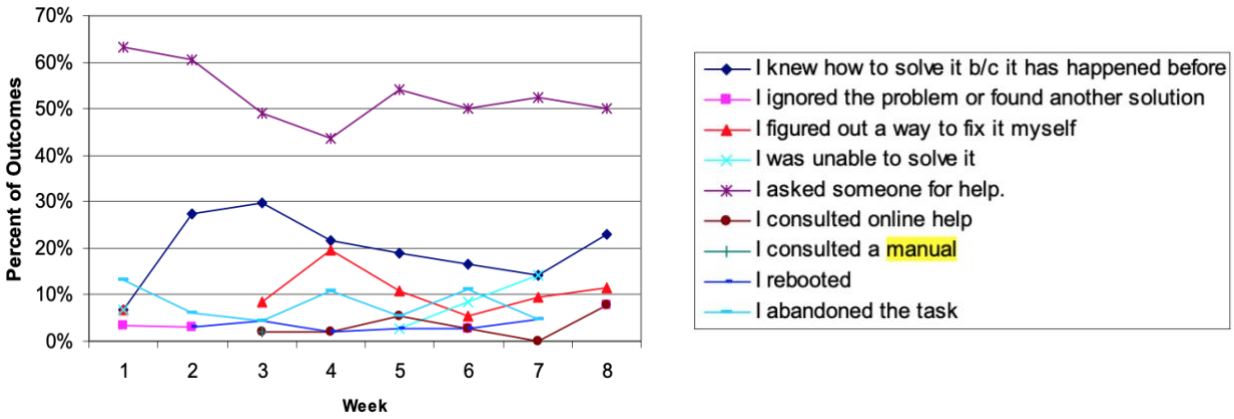

Figure 9: Connected Scatter Plot of Consumer Approaches to Solving an Appliance Issue. Percentage breakdown of various solutions used by consumers when facing an issue with their appliances (Mendoza & Novick, 2005).

The dishwasher industry needs to investigate initiatives taken by the other industries, like Subaru and Horizon Blue Cross Blue Shield of New Jersey, to improve users' access to information. Subaru realized that their consumers did not know how to operate certain vehicle functionalities. Mayer (2002) stated that to enhance the consumer experience, Subaru considered implementing options such as orientation clinics for new owners, drawing attention to items under the hood, or providing a much shorter manual, in addition to the standard manual. The automotive industry provides insight into new solutions for the dishwasher industry.

Horizon Blue Cross Blue Shield (BCBS) of New Jersey has also been extremely successful in tackling the lack of consumer knowledge that the dishwasher industry is currently facing (Mayer, 2002). Horizon BCBS of New Jersey provides insurance to over 3.2 million people ("Horizon Blue Cross Blue Shield of New Jersey welcomes more than 40,000 previously uninsured to OMNIA," 2016). A successful method they have used is calling new members for 15 to 30 minutes (Mayer, 2002). During this call, representatives help the consumer thoroughly understand the benefits and costs of their health plan. By implementing this simple new medium of communication in addition to the information packet, their levels of consumer satisfaction increased dramatically from around 60% to 85% (Mayer, 2002).

NEXT STEPS FOR THE DISHWASHER INDUSTRY

Various consumer opinion and usage studies, such as the one performed by the U.S. Energy Administration have demonstrated that dishwasher usage drastically lags behind other household appliances. To ensure longevity for the dishwasher industry, manufactures must investigate multiple aspects of their demand-side market such as false interpretations upheld by consumers about the appliance. These fallacies result in a quantifiable decrease in product usage and contribute to an ongoing crisis of resource waste, described in the study performed by FINISH and Richter. However, this investigation process cannot be rushed because there are multiple actors to consider. These actors range from consumers to regulation, as described through the SCOT approach.

To increase consumer understanding of dishwasher functionality, dishwasher manufacturers need to test various mediums of information distribution. The initial steps of dishwasher manufactures should focus on determining the sources of these misconceptions and concerns are identified through monitoring consumer reviews. Creating automated category-

specific dictionaries has been proven by Law et al. (2017) to be an effective method for monitoring consumer reviews in real-time.

By obtaining an understanding of the consumer market, dishwasher manufacturers can implement resources to educate consumers about methods to optimize their experience, beyond the standard user guide underutilized by most consumers. User manuals are no longer an effective medium to communicate information about products, but other industries have overcome this barrier by adopting new procedures to transfer critical information about their products. Some successful examples are Subaru's short infographic and Horizon Blue Cross Blue Shield of New Jersey phone calls. Dishwasher manufactures will need to employ and modify these techniques to best address the issues within their consumer market.

A thorough comprehension of consumer demands is necessary to determine which features are essential for the next-generation dishwasher. Learning from the successes and failures of previous manufacturers will contribute to the understanding of consumer trends. Information obtained regarding the relationship between user and manufacturer will provide a foundation to investigate the key discrepancies between these two actors. Using the STS research as a guideline, the technical project will perform a detailed analysis and provide possible solutions to these problems identified in phase 1 of consumer research. The ultimate goal for dishwashers remains the same: to have clean dishes after you run a cycle. Constantly evolving societal expectations impact people's standards for the functionalities and convenience of their dishwashers, so it is essential for dishwasher manufactures to respond to these altering perspectives. By learning how to persuade consumers to adopt more efficient and effective behaviors, the dishwasher industry could experience higher levels of consumer satisfaction, increased trust from consumers, and a boost in profits.

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