

Case Study: Impact of Natural Language Processing on Telemarketing

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Introduction, and Statements of the Research Problem, Purpose & Question

Introduction

Artificial Intelligence (AI) stands to impact all areas of the global society. The dictionary defines AI as, “The capability of a machine to imitate intelligent human behavior” (retrieved from <https://www.merriam-webster.com/>, n.d.). This definition is similar to John McCarthy’s (1927-2011) vision. Dr. McCarthy was involved in AI research since 1948 and was the first to use the term AI. Dr. McCarthy’s 1955 proposal was that, “... every aspect of learning and other properties of intelligence can be described so precisely that a machine can simulate it” (Lischka, 2011). As AI has the potential to revolutionize our world it is being called the fourth industrial revolution. The first industrial revolution began around 1800. During this revolution, for the first time, goods and services were produced by machines. “Hard” capital in the form of railways, heavy industry, and the steam engine were essential inventions during this phase. The second revolution began at the end of the 19th century with electrification and the “soft” process innovation of the assembly line. The third industrial revolution began in the 1970s and was distinguished by further automation through electronics. With the personal computer and the internet, global access to information became possible. The newest, fourth revolution, is the technical integration of cyber and physical systems. Now production is becoming controlled by decentralized self-organized machines being optimized in real time (Lischka, 2011).

Stephen Hawking is quoted as saying, “The rise of powerful AI will be either the best or the worst thing ever to happen to humanity.” According to a survey by Pew Research Center, 65 percent of US citizens expect that within 50 years a robot or an intelligent algorithm will be doing their work (Smith, 2019). AI in some form is currently being implemented worldwide.

According to Marianne D'Aquila, research manager of IDC, a worldwide technology consulting company, "AI has moved well beyond prototyping and into the phase of execution and implementation." There are four key drivers behind the rapid progress in AI technology: 1) Decades of exponential growth in computing performance, 2) Increased availability of large datasets upon which to train machine learning systems, 3) Advances in the implementation of machine learning techniques, and 4) Significant and rapidly increasing commercial investment (Allen & Chan, 2017). These drivers are unlikely to decelerate. Clearly understanding the nature and impact from AI on industry and society will help prepare global leadership in preparing for the changes it will bring.

In the near term, AI is predicted to have wide-ranging applications, including: 1) Machine learning that automates analytical model building by using algorithms that allow machines to operate without human assistance. 2) Virtual personal assistants that help users by providing reminders, scheduling appointments, organizing their finances, and finding providers of various services. 3) Machine vision that allows computers to identify objects, scenes and activities in images. 4) Natural language processing (NLP) that allows computers to analyze, understand, and generate language to interface with humans using natural human languages (Chen, et al., 2016).

When previous "disruptive" technologies were introduced planning was important. Perhaps with AI it is more critical than ever for decision makers to plan. This research proposal will examine a small portion of the impact from AI. It will examine how natural language processing (NLP) is being implemented in the area of telemarketing/E commerce and attempt to identify the societal and industry intangible costs and benefits derived from its use.

Statement of the Research Problem

Natural language processing (NLP) systems are being introduced as a method to maximize the benefits from a telemarketing effort and minimize the cost of service call processing in many for-profit organizations. However, the intangible costs and benefits from the introduction of these systems are not well understood. Much of the literature has focused on the procedures and methods of implementation. Occasional statements relating to tangible organization costs savings and other benefits are made. However, little attention has been made to the intangible costs and benefits both inside and outside the organization from NLP implementation within telemarketing operations. Potential intangible costs might include wide-spread dissatisfaction with intrusive automated contacts; or specific employee dissatisfaction with machine guided responses, evaluations, and/or control. Conversely, intangible benefits might include global consumer appreciation of more targeted communications; or specific employee coaching enhancements or other job satisfaction related areas.

AI has been of interest to me for many years and will be the focus of my PhD dissertation in Political Economy. As the impact of AI is projected to have significant impact on every aspect of society, targeting a specific aspect of this new technology and developing a granular understanding of the invisible (i.e. intangible) costs and benefits from its implementation should help future researchers extend analysis into other AI areas and guide leaders in policy development.

Statement of the Research Purpose

The purpose of this study will be to uncover and describe the intangible costs and benefits associated with the deployment of an NLP system in the telemarketing processing function of a

for-profit organization. A case study methodology will be followed in order to develop an in depth understanding of those costs and benefits. Here an intangible cost/benefit will be defined as an unquantifiable externality emanating from an identifiable source that can impact overall company performance and the larger public. Rather than being material, intangible costs/benefits arise from causes that are social, legal, or political (Hayes, 2020).

Statement of the Research Question

What organizational and society level intangible costs/benefits are involved in the deployment of an NLP systems in the telemarketing processing environment? This general question can be separated into several more targeted questions. What are the organizational level intangible costs/benefits associated with NLP systems? How can organizational level intangible cost/benefits be measured? How can organizational level intangible costs/benefits be minimized/maximized? What are the sociality level intangible costs/benefits associated with NLP systems? How can societal level intangible costs/benefits be measured? How can societal level intangible costs/benefits be minimized/maximized? Are firms recognizing/evaluating intangible cost/benefits at either the firm or societal levels? If so, how are they recognizing/evaluating intangible costs/benefits?

Literature Review

The term telemarketing refers to a systematic and continuous program of communicating with customers and prospects via telephone and/or other person to person electronic media (Moncrief, 1989). Generally, telemarketing operations have two primary purposes. First, to make cost-effective sales calls and second, to maintain stronger customer relations (Marken, 1984).

Telemarketing can be used to support advertising campaigns, as a service center to handle problems with delays, lost orders, or it can be used for general customer service (Moncrief, 1986). One tangible benefit of telemarketing has long been understood. Particularly, telemarketing operations can conduct sales calls and other customer services much more quickly and more efficiently than having a salesperson meet with the customer face-to-face. However, the lack of face-to-face has the intangible cost of weakening interpersonal customer relations. In addition, to the lack of interpersonal relationships, telemarketing suffers from a loss of signal fidelity from what is known as Polanyi's paradox, named after the economist, philosopher, and chemist who observed in 1966, "We know more than we can tell" (Polanyi 1966; Autor 2015). That is, there is more intangible information in interpersonal connections than can be easily articulated.

NLP technologies has the potential to disrupt the business landscape by helping to uncover some of this intangible information within the telemarketing and E Commerce business (Srihari, 2019) and better utilize it. However, as some intangible information may be made tangible other intangibles may arise. In much of the literature intangible costs/benefits are either unclearly identified or left unmentioned.

Attempts to define the needs of organizations doing business over the telephone and to automate telephone services using NLP technology began early in the twenty-first century (Brondsted, 1999). NLP technology used in call centers roughly falls into four categories: real time speech recognition (i.e. to build a sophisticated interactive voice response system), conversation management (i.e. ensures simultaneous processing of multi path conversations), intent analysis (i.e. frames conversations based on context to predict customers intent), and conversational analysis (i.e. broadly analyzes users historical audio to uncover insights about topics and trends

in customers actions) (Renner, 2020, Shan, 2019). Again the topic of intangible costs/benefits are not addressed in any of these reviews.

Real time speech recognition understands that each sentence is a piece of a larger dialogue used to convey messages. This understanding is challenging for NLP systems but the ability for such systems to do so has increased dramatically (Loeshelle, 2019). Some systems use response databases having 6 to 10 million statement response pairs (Rosser & Sturges, 2010) allowing such capability as 24/7 customer access to non-human systems able to answer complex questions (Renner, 2020 & Jandwanit, 2016). These improvements have allowed organizations that utilize real time speech recognition within their telemarketing operations to reduced employee churn rates, lower the average time a customer spends on hold, and have far fewer escalations from frustrated customers (Renner, 2020). Here employee churn rates can be a tangible cost but also an intangible benefit as it likely results in greater employee satisfaction. Obviously, increased customer satisfaction from reduced hold times and frustration can also be an intangible benefit. Additionally, it is likely that implement issues arose during system deployment resulting in both customer and employee dissatisfaction. Within the literature reviewed these intangibles were not discussed.

Conversation management is an important NLP application. Even before a call is routed to an human agent, incoming calls can be processed through algorithms which can interpret long strings of words, like “ I have a weird charge on my bill I want to talk to someone about,” and route the caller to the correct department (Marr, 2016). Even further, algorithms can identify the best agent to handle each caller based on the agent's past performance and personal strengths, and the customer's personality and other behavioral characteristics (Marr, 2016). For example, algorithms can detect a caller's age and that information can be used to direct the customer to an age

appropriate human agent or provide age appropriate responses (Marr, 2016). Real time speech analysis, combined with predictive analytics, can also detect when a caller is on the verge of getting frustrated or angry - or even predict when a caller is lying or trying to commit fraud (Marr, 2016) the such information can be feed back to the human agent for disposition. The literature was not forthcoming of the level of increased customer/employee frustration that might occur from NLP errors in routing customers to the wrong agent or that age related biases might be being perpetuated. While the benefits from lie or fraud detection are clear, the literature did not disclose the results from inappropriate responses due to false positive lying or fraud detection. These are important variables which more detailed review can help to evaluate.

Intent analysis can also be used in real time to process a customer's statements and deter their purchase intention according to their parsed statements. This allows signing of the human agent to select the appropriate sales pitch response corresponding to the determine customer purchasing intention (Ding, Tien, & Hsiao, 2020, Renner, 2020). Again, while to benefits seem clear from this use of NLP technology, little mention was made from false positive intention detection or potential system bias impacts.

Conversational analysis can be conducted outside the real time environment. Most Americans have heard the recorded message that "your call may be recorded for training and quality purposes." Companies are realizing that those recordings have a great deal of value (Marr, 2016). Organizations are now using recorded customer speech analysis to analyze the caller's tone, vocabulary, sentiment and even silences to gauge emotions and satisfactions (Marr, 2016, Loeshelle, 2019, Sha, 2019). This can have the intangible benefit of providing more personalized customer service. However, it does represent an intrusion on customer privacy. Moving beyond verbal information, NLP can also analyze customer social media posts or

customer satisfaction surveys for lead prospecting (Srihari, 2015) or to evaluate brand awareness or conduct competitor analysis (Maksymenko, 2020). Again, privacy issues are not being addressed.

Conversational analysis can also be used to evaluate agent performance. Speech can be used to identify gaps in an agent's knowledge, type of calls they are least comfortable handling, and other factors that can influence training and future call routing (Marr, 2016, Renner, 2020). NLP can also evaluate employee active and passive listening skills (Koehi, Pouiol & Tanner, 2016). The benefits appear clear from this use of NLP but deeper evaluations might detect employee resentment to constant evaluation.

One area of intangible costs rarely mentioned in the literature relates to the loss of visibility into the behavior of many NLP systems. NLP often employs a technology known as a neural network. Such networks do not allow for the owner to “reach into” the logic of the system to specifically identify how the system is functioning. Basically, the user only sees the input and the output; the rest is a “black box.” This has created concerns with some governments interested in organizational transparency. Some companies are now beginning to provide tools to help companies develop that transparency (Alonso, 2019). Questions regarding this aspect of NLP certainly should be investigated further.

As stated previously, it appears clear from this literature that there is a gap in the identification of many of the intangible costs/benefits associated with the implementation of an NLP system in telemarketing organizations. Filling this gap should provide leaders and policies makers with a more comprehensive view of the impact from this new technology.

Research Design

Theory

In order to evaluate whether a NLP system should be implemented it is likely that the case study target(s) will have used some type of business decision making process (Stagner, 1969) including an economically determined investment evaluation (Hirshleifer, 1958). These approaches will generate the initial cost/benefit evaluations. It is likely that only “hard” cost/benefit evaluations will be included, and “soft” intangible cost/benefits will not. Once the decision to implement the NLP system is made the case study target(s) will likely engage in a business/customer change process using some model of change leadership (Moore, 2001). This implementation process will likely lead to post implementation evaluations, again including only “hard” cost/benefit evaluations and excluding intangibles. To understand the intangibles, it will be necessary to evaluate both customer and employee reactions to the NLP. The mental model theory hypothesizes that people create model(s) when understanding verbal communications (Craik, 1952; Johnson-Laird, 1983). I suspect that those models will be critical in understanding how people, especially customers, react to the NLP system. Various components such as NLP voice gender, tones, etc. likely influence human mental models. These reactions are likely to produce significant intangible costs/benefits. While customer impact is likely high, I suspect that employee direct interaction with the NLP system will be less impactful. However, there are likely process change costs, some intangible, associated with NLP implementation at the employee level. One area of likely important intangible cost/benefit will be how NLP is incorporated into long-term business processes. Computationality theory (Berry, 2011; Lakatos

1980; Craik, 1952) suggests that new modes of understandings will arise from NLP systems as well as potential ontological losses. New modes of customer interaction could develop through business detection of cultural norms. New modes of communication might also become available. Such modes might include the detection of customer preferences through language visualization techniques; or through other aspects of the digital evaluations allowing for new inquiries into the materials produced by the NLP system. These areas will likely be fertile ground for the identification of intangible costs and benefits.

Methodological Approach

This proposal contemplates the use of the case study research methodology. The case study methodology involves the examination of issues through one or more cases within a bounded system (i.e., a setting, a context). Case study research is a qualitative approach where the researcher explores the bounded system or multiple systems over time, through in-depth data collection. Often data is collected from multiple sources, including observations, interviews, audiovisual material, and documents and reports (Creswell, 2007). Case studies may use both qualitative and quantitative evaluations. Here, in this research, the bounded system is/are organization(s) (i.e. firm, corporation, etc.) utilizing NLP within a telemarketing operation. All forms of data collection strategies, noted immediately above, are contemplated in this research proposal. The research will be of a holistic nature in an effort to understand the entirety of the process and depending on data availability, both qualitative and quantitative evaluations may be used in this study.

Method of Data Collection

As prescribed by the case study methodology, this proposal intends to gather appropriate organization (i.e. firm, corporate, etc.) documents and records (e.g. efficiency and cost data reports, conversational summaries, scripts, incoming and outgoing call logs, audio recordings, etc.) and conduct appropriate observational protocols. The identification of these types of materials and protocols will likely occur during extensive semi-structured interviews (see interview section below) with both executive and middle management, and staff, as well as customer interviews where possible. During interviews participant observations will also be gathered. The intent of this data collection effort will be understanding the variations and commonalities experienced by each case. It will also be used to generate the lists of intangible costs and benefits, both within the organization and external to the organization, for further exploration and analysis.

Study Population

The general target population for this study will be medium to small for-profit organizations engaged in telemarketing strategies. As costs will likely be a constraint the organizations will be in the Dallas, Texas geographical region reasonable reachable by automobile. The preferred target will have recently implemented an NLP system. This is preferred as the impacts from the implementation process will be fresh in the minds of the participants. Recruitment of this population will come from direct solicitations for targets identified within trade magazines and from referrals from AI consulting firms.

Sampling Strategy or Strategies.

It is anticipated that the target count will be small and, therefore, sampling will likely be of an opportunistic nature. If, however, several target organizations are available sampling will be purposeful based on obtaining the greatest degree of sample various possible.

Role of the Researcher

The role of the researcher is central to any qualitative study. In this study the researcher will attempt to maintain an epistemologically neutral position and lessen the distance between the researcher and the researched in order present an objective as possible analysis.

Ethical Issues

Maintaining appropriate levels of confidentiality is likely the most significant ethical issue to be encountered in this case study. Confidentiality will likely arise specifically relating to consumer and employee personally identifiable information. Inappropriate disclosure of comments “off the record” or disclosure of information that might be harmful to the interviewee will be of concern. There are certain laws governing telemarketing operations (e.g. Telephone Consumer Protection Act) and AI (e.g. European General Data Protection Regulation) applications. Disclosure of observations of violations of these laws will have to be resolved prior to field work. Otherwise, I do not foresee any other significant ethical issues from my project.

Findings (anticipated)

Data Analysis (Themes and Relationships among Themes)

This researcher anticipates that most organizations will engage in a type of process change methodology. The methodology will range from high to low rigor. The higher the rigor the more cost/benefit identification will be occur. Regardless of the change methodology, this

researcher anticipates that most identification will surround tangible costs and benefits.

Intangibles will be weakly identified, if at all. Therefore, the identification of intangibles will require special attention from the researcher. In addition, to weak identification of intangible costs and benefits, this researcher also anticipates that most organizational cost/benefit analysis will be directed internally and on direct customer impacts. Community impacts (i.e. externalities) will not be considered neither those being of a tangible or intangible nature. Again, this will require attention by the researcher.

Listed below are examples of anticipated intangible costs likely to be identified during this research project:

Impact Level	Changes in Intangible Costs/Benefits
Customer	Frustration, Satisfaction (organization, product, service, etc.), Perceived choice, etc.
Employee	Job satisfaction (workload, training, perceived value, etc.), privacy, etc.
Organizational	Perceived control, flexibility, opportunities, etc.
Community	Perceived trust, intrusion, privacy, etc.

It is unlikely that intangible costs/benefits will be measured or monitored by the organization and, therefore, will require special attention and measurement techniques from the researcher.

In general, this researcher anticipates a major theme to reflect that organizations can better judge the impact from NLP system implementations through reflection on the intangible costs/benefits

generated by such systems. It is likely that this overall theme will breakdown by stages of pre-implementation, implementation, and post-implementation. Each stage is likely to represent unique evaluations and challenges but also represent a flow of impacts tying each stage one to the other.

Interpretation of Findings

Pending outcome of research.

Progress Report

Many features of this research project remain to be completed. These include:

- Investigation, solicitation, and selection of case study target(s).
- Obtaining all necessary university faculty and Institutional Review Board (IRB) approvals.
- Detail development of interview questions for initial, engagement, and exit portions of the study.
- Gather, catalog, and secure available documents, reports, and audio/visual materials.
- Conduct interviews of executives, middle managers, employees, and customers.
- Analyze available documents, reports, and audio/visual materials, and interview results.
- Draft final report according to the following outline:
 - Vignette.
 - Statements regarding issues, purpose, and methods.
 - Statement of researcher qualifications.
 - Full description of data and research process using either a descriptive or chronological approach as deemed appropriate.
 - Identification and presentation of key issues, including inadequate analysis as appropriate.
 - Summary statements regarding key assertions.
 - Summary conclusions and recommendations.
 - Closing vignette.
 - Concluding disclosures of researcher's interpretation of complex situation(s) present challenges to external validity.
- Obtaining final report approvals.

Policy Relevance

There are several potential policy related outcomes from this research. Likely these policies will relate either to the for-profit organization or be of a governmental nature. From the organizational level, policies might arise relating to the implementation of AI/NLP systems surrounding the relationship between the organization and its employees. For example, changes to communication/disclosure policies with employees might be desirable; or new policies regarding how the human resource department handles employee monitoring and discipline might be appropriate. Policies relating to the relationship between the organization and its customers might be needed. For example, new customer disclosures or warnings might be considered in light of the AI/NLP implementation. From a governmental perspective, laws regarding greater transparency into the working of AI technology implementations might be considered. Additionally, regulations regarding employee and customer monitoring might be considered. It is likely that more elaboration on policy possibilities will develop as more detailed research is conducted. All suggestions should ultimately be evaluated through a framework which considers the goal, problem, competing solutions, implementation, enforcement, and monitoring aspects of the recommended policy.

Interview Questions, Focus Group Questions, Observation Protocol, Questionnaire Questions, and/or Names of Databases

Sample interview questions are listed below.

The following questions are designed for executive or middle managers.

First Question: Can you tell me a little about your experience with implementing and running this new system/process?

Probing Questions: Can you tell me a little more about the initial stages of the implementation? Can you describe your impressions about the actual implementation process? Can you describe how you knew the implementation was completed? What are your perceptions about the ongoing process?

Second Question: What were/are the costliest features of the implementation/running of this system?

Probing Questions: Did you need to add staff? Were upgrades to your data processing systems required? Was additional data storage required? Did employees feel anxiety? Were there any organizational disruptions? Did customer complaints increase?

Third Questions: What would you say were the largest benefits from the new system?

Probing Questions: Was there a labor cost savings? Were you able to handle more customers in less time? Did customer satisfaction improve? Did you experience organizational efficiencies?

Fourth Question: As you think over this implementation do you consider that the costs were outweighed by the benefits and why?

The following questions are designed for employees.

First Question: Can you tell me how you felt the implementation of the new system/process went?

Probing Questions: Can you tell me a little more about the initial stages of the implementation? Can you describe your impressions about the actual implementation process? What are your perceptions about the ongoing process?

Second Question: What do you see as the greatest enhancements to your job from the implementation of the new system?

Probing Questions: Has the system made your job easier? In what ways has it made it easier? Has the system improved your customer interaction? In what ways has it improved those interactions? How do you know, it has improved those interactions?

Third Question: What do you see as the greatest detriments to your job from the implementation of the new system?

Probing Questions: Has the system made your job more difficult? In what ways has it made it more difficult? Has the system worsened your customer interaction? In what ways has it worsened those interactions? How do you know, it has worsened those interactions?

Bibliography / Citations

- Allen, G., & Chan, T. (2017). Artificial intelligence and national security. Cambridge, MA: Belfer Center for Science and International Affairs.
- Alonso, J. M., & Bugarín, A. (2019, June). ExpliClas: automatic generation of explanations in natural language for WEKA classifiers. In 2019 IEEE International Conference on Fuzzy Systems (FUZZ-IEEE) (pp. 1-6). IEEE.
<https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8859018>
- Autor, David, H. J. J. O. E. P. (2015). Why are there still so many jobs? The history and future of workplace automation. *Journal of economic perspectives*, 29(3), 3-30.
- Berry, D. (2011). The computational turn: Thinking about the digital humanities. *Culture machine*, 12.
- Brøndsted, T. (1999). The natural language processing modules in REWARD and intellimedia 2000+. *LAMBDA*, 25.
<https://pdfs.semanticscholar.org/8b60/516072b1fc8b220812163027d446fdf75c26.pdf>
- Chen, N., Christensen, L., Gallagher, K., Mate, R., & Rafert, G. (2016). Global economic impacts associated with artificial intelligence. Analysis Group.
- Craik, K. J. W. (1952). The nature of explanation (Vol. 445). CUP Archive.
- Creswell, J. W. (2007). Qualitative inquiry and research design: Choosing among five approaches. Sage publications.
- Ding, J. C., Tien, C. C., Hsiao, H. H., & Tu, C. L. (2020). U.S. Patent Application No. 16/802,307.
<https://patentimages.storage.googleapis.com/9e/ae/95/0f834f4ba48e1e/US20200274970A1.pdf>
- Hayes, A. (2020, September 16). Intangible Cost Definition. Retrieved September 29, 2020, from Berry, D. (2011). The computational turn: Thinking about the digital humanities. *Culture machine*, 12.
- Hirshleifer, J. (1958). On the theory of optimal investment decision. *Journal of political economy*, 66(4), 329-352.
- Jandwani, N. (2016). U.S. Patent No. 9,509,846. Washington, DC: U.S. Patent and Trademark Office. <https://patents.google.com/patent/US9509846B1/en>
- Johnson-Laird, P. N. (1983). Mental models: Towards a cognitive science of language, inference, and consciousness (No. 6). Harvard University Press.
- Koehl, M., Poujol, J. F., & Tanner Jr, J. F. (2016). The impact of sales contests on customer listening: an empirical study in a telesales context. *Journal of Personal Selling & Sales Management*, 36(3), 281-293.

- Lakatos, I. (1980). The methodology of scientific research programmes: Volume 1: Philosophical papers (Vol. 1). Cambridge university press.
- Lischka, K. (2011). John McCarthy: Der Vater der Rechner-Cloud ist tot - DER SPIEGEL - Netzwelt. Retrieved May 5, 2020, from <https://www.spiegel.de/netzwelt/web/john-mccarthy-der-vater-der-rechner-cloud-ist-tot-a-793795.html>
- Loeshelle, E. F. (2019). Debunking Natural Language Processing. Retrieved November 08, 2020, from https://www.clarabridge.com/resources/debunking-natural-language-processing?utm_source=google&utm_medium=cpc&utm_campaign=nlp-ebook&gclid=Cj0KCQiAy579BRCPARIsAB6QoIbRIqWBp6MUMjqOxfGbN4U9jw4tS0ZBrTNcCthf3wxrXpjInKVfHHEaAnz9EALw_wcB
- Maksymenko, Serhii. (2020). 5 Use Cases for Natural Language Processing Application in Marketing. Retrieved November 08, 2020, from <https://customerthink.com/5-use-cases-for-natural-language-processing-application-in-marketing/>
- Marken, G. A. (1984). High-Tech: How it Maximizes Business Software Customer Contact. *Business Marketing*, 69, 38-42.
- Marr, B. (2016). How Analytics, Big Data and AI Are Changing Call Centers Forever. Retrieved November 08, 2020, from <https://www.forbes.com/sites/bernardmarr/2016/09/06/how-analytics-big-data-and-ai-are-changing-call-centers-forever/?sh=ff77f073a322>
- Merriam-Webster: America's most-trusted online dictionary. (n.d.). Retrieved from <https://www.merriam-webster.com/>
- Moncrief, W. C., Lamb Jr, C. W., & Dielman, T. (1986). Developing telemarketing support systems. *Journal of Personal Selling & Sales Management*, 6(2), 43-49.
- Moncrief, W. C., Shipp, S. H., Lamb Jr, C. W., & Cravens, D. W. (1989). Examining the roles of telemarketing in selling strategy. *Journal of Personal Selling & Sales Management*, 9(3), 1-12.
- Moore, R. (2001). *Philosophies of Leadership and Management and Its Influence on Change*. Distributed by ERIC Clearinghouse.
- Polanyi, Michael. (1966). *The Tacit Dimension*. New York: Doubleday.
- Renner, L. (2020). Case Study: Using Natural Language Processing to Build a Sophisticated Interactive Voice Response System. Retrieved November 08, 2020, from <https://www.manceps.com/articles/case-study/case-study-using-natural-language-processing-to-build-a-sophisticated-interactive-voice-response-system>
- Rosser, R. J., & Sturges, S. B. (2010). U.S. Patent No. 7,783,486. Washington, DC: U.S. Patent and Trademark Office. <https://patentimages.storage.googleapis.com/e8/ef/b2/3c64f51a673eea/US7783486.pdf>

- Sha, Y. (2019). Natural Language Processing in Call Centres. Retrieved November 08, 2020, from <https://syncedreview.com/2019/03/16/natural-language-processing-in-call-centres/>
- Smith, A. (2019). Future of Workforce Automation: America's Predictions. Retrieved May 5, 2020, from <https://www.pewresearch.org/internet/2016/03/10/public-predictions-for-the-future-of-workforce-automation/>
- Srihari, R. (2019). How can NLP technology be used for marketing? Retrieved November 08, 2020, from <https://econsultancy.com/how-can-nlp-technology-be-used-for-marketing/>
- Stagner, R. (1969). Corporate decision making: An empirical study. *Journal of Applied Psychology*, 53(1p1), 1.