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SOCIAL IMPACT IN PRODUCT DESIGN, AN EXPLORATION OF CURRENT INDUSTRY PRACTICES

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ABSTRACT

Though academic research for identifying and considering the social impact of products is emerging, the actual use of these processes in industry is undeclared in the literature. The gap between academic research and the industry adoption of these theories and methodologies can have real consequences. This paper explores current practices in industry that design engineers use to consider the social impact of products during the customer use stage. 30 people from nineteen different companies were interviewed to discover what disconnects exist between academia and industry when considering a product's social impact. Although social impact assessments (SIA) and social life cycle assessments (SLCA) are two of the most common evaluative processes discussed in the literature, not a single company interviewed used either of these processes despite affirming that they do consider social impact in product design. Predictive processes were discussed by the respondents that tended to be developed within the company and often related to government regulations.

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1 INTRODUCTION

Literature and historic research show a long tradition of analyzing the economic and environmental impacts of designed products, yet there is a lack of data and resources related to social sustainability — a pattern within the engineering field that does not need to be continued [1]. Engineers stand in position to pioneer best practices in accounting for a holistic view of sustainability, where "Sustainability Engineering is poised to propel the industry into a future that combines permanence, profitability, as well as livability" [2]. As engineers design with all aspects of sustainability in mind, they are likely to create effective and desirable products while also influencing the worlds economic standing, environmental state, and social wellbeing. Though designing engineered products and systems from a social wellbeing perspective is an emerging topic *in literature*, this paper seeks to understand to what extent designing for social impact is found *in industry*. The goal is to understand how those who design products consider the impacts of those products, therefore the terms engineer and designer will mean those who have a significant role in defining and designing a product, structure, or industrial process.

Overview of Sustainability

As defined by the 1987 Brundtland report, sustainable development is ”to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs” [4]. In many cases this has been broken into the three pillars of sustainability which are economic, environmental, and social impacts [6, 7]. By empirically researching how engineers and designers consider this concept, the benefits of sustainability can be increased as a better understanding of the functionality of sustainable design is defined.

Assessing the Social Impact of Products

Social impact refers to the effect that an engineered product has "on the day-to-day quality of life of persons" [5]. Specifically, the research of this project centralizes on the social impacts identifiable at the product use level. Beyond the scope of this study is the social impact an organization produces throughout the supply-chain of a given product or the programs instituted for community outreach.

This understanding of social impact establishes the purpose of this study, which is to determine the current standing of social impact design and assessment within the engineering and product design sector. To address this subject, work conducted by an interdisciplinary team of researchers from the Mechanical Engineering and Social Science disciplines provide initial findings on the current practices of engineers in product design for social impact through the use of industry interviews. While social sustainability research may be lagging behind economic and environmental sustainability, current practices within the engineering field can prove that social sustainability is being increasingly accounted for.

2 LITERATURE REVIEW

Recent work by the authors seeks to develop a holistic picture of what the current state of social impact is for product design. A three tier approach has been implemented to gain a wide breadth of understanding on this topic. These tiers include a review of 1) the literature [8], 2) products in use [9], and now 3) industry practices. Understanding current industry practices is particularly interesting because there are likely differences between what is published by academics and what practicing engineers actually do [10]. To this end, the current paper is one step towards understanding the gap between academic literature and industry practice.

2.1 Engineering Design & Social Impact in Academia

The literature provides processes and methods to engineers and other stakeholders to use for *evaluating* the social impact of their products. This includes methods such as Social Impact Assessments (SIA) [11, 12], as well as Social Life-Cycle Assessments (SLCA) [13, 14, 15, 16]. The challenge may be in the usability of these processes [17]. Concerns have risen that social sustainability is not given as high a priority as economic and environmental sustainability [18]. An additional concern is that most measurements are not comparable across products. Work has been done towards developing metrics that may show quantifiable insights regardless of the product type or industry [19]. Others have become concerned with tools relying too heavily on biases and that systematic errors may be influencing the accuracy of these methods [20]. Some methods show promise but may be limited in scope to just the manufacturing and supply chain of products [21].

Less discussed in literature are methods for *predicting* social impact in early design stages. The processes that do exist focus on full sustainability, which includes not only social impacts, but economic and environmental as well [22, 23]. Even these contributions acknowledge the need to improve design tools for social impacts.

While most methods seek to characterize the impact a product has had from gathering historical data of the product in use, there are very few tools available to assist in predicting impacts and informing engineers/stakeholders before production. The literature in this area may not be as developed as other disciplines in engineering, but some resources are available to practicing engineers if they desire it.

2.2 Social Impact in Industry

Only a few have published details regarding the penetration of these social impact processes into industry. Garay and Font show that social responsibility is becoming more important in today's business environment, but many say budget constraints appear to prevent them from participating fully [24]. Jørgensen et al. looked at the feasibility of SLCA from a company's perspective showing that companies lacked a "resource-efficient" process that could look solely at the use stage of their products. Short et al. found that companies in Europe show great interest in designing for sustainability but lack the knowledge of how to best implement it [25].

3 METHODOLOGY

Aligning with the goal to gain a deeper empirical understanding of the role social impact takes within the sphere of product design, empirical studies were conducted that utilized social science research methods to collect and analyze data on products created within the engineering sector.

3.1 Experiment Design

Our empirical studies center on interviews conducted with 30 professionals who design products in various industries within the United States. The extent to which engineers and product designers considered social impacts in the design process, which social impacts they considered, and whether they have procedures in places for measuring and evaluating social impacts among end users constituted the initial themes of the interviews. Prior to the interviews, the following hypotheses were constructed:

1. Companies do not have processes in place to consider the social impacts of the engineered products they design.
2. Engineers only consider social impacts that have a direct negative health and safety impact.
3. Engineers have little to no tools to measure the social impact of their designs.
4. If there are tools available, they are only for measuring very specific impact types.

The use of in-depth interviews was employed as the preferred research method for testing these hypotheses [26]. As is common within qualitative research, the use of typical case sampling was employed when creating the sampling frame of the study [27]. With this type of purposive sampling, emphasis was given on treating each interview as a unique case that informs the ultimate research questions [28]. Direct effort was given to find cases that represented various sectors, company sizes, and industries among the organizations contacted and selected for an interview.

A variety of organizations fall within the product engineering and design sector, of which our research is interested in. In order to represent this variety, special attention was given to identifying specific organizations from a wide variety of industries. Included among the companies contacted were organizations that produce products related to the following industries: construction, consumer products, defense, infrastructure, manufacturing, medical, mining, transport, and water.

Though random sampling was not employed within the context of this study, the practices of generalization is not beyond the scope of the project. Just as is best practice within qualitative research, findings can lead to logical rather than statistical generalization [29]. It is assumed that the cases and individuals presented within this study are typical of engineers and designers throughout the sector and their shared experiences are valuable contributions to the ongoing conversation centralized on the role social impact assessment plays within the field of product design.

While 15 of the 20 companies identified for interviewing were local, being located within one hundred miles of Provo, Utah, a conscious effort to provide for national perspectives was maintained. In order for more national representation, the use of phone interviews was established.

3.2 Procedure

Each interview, whether conducted locally or remotely, was directed by the use of a set interview guide. Emphasized in the interview guide were specified subtopics that addressed each research question and tested the aforementioned hypotheses. The two conductors of the interviews were encouraged to use the interview guide not as a ridged lineup of questions but rather as a tool to direct the conversation. Though the order of subtopics and connected questions were left to be decided upon by the interviewer, stress was given to address each point at some point throughout the interview in order to maintain consistency across the interviews.

Interview questions were formatted in such a way as to include open-ended questions about how individual engineers and the organizations they have worked for navigated considering, designing for, and assessing social impact. In particular, open-ended questions were presented that required the interviewee to consider if their product influenced such social impact categories as: population change; family; gender; education; stratification; employment; health, safety, and wellbeing; civil rights; networks and communication; conflict and crime; and cultural identity and heritage [8].

Once the interviews were conducted, transcription of each interview was completed by both interviewers as well as through outsourcing to a transcription company. After the transcription process was finalized for each of the interviews, the two interviewers began the coding process [30].

Initial coding of each interview followed an open coding method. Here, various themes began to surface in relation to the already established research questions and hypotheses. The researchers encouraged findings to emerge from the coding process itself rather than code strictly to prior-identified themes. This left the process open to unexpected findings and themes. Once repeated themes were initially identified from the open coding process, the researchers began employing the axial coding method to better define the emerging themes [31].

The final method used during this step of the procedure was selective coding [32]. To avoid bias, two researcher coded each interview looking for separate sets of codes. Throughout each interview the main distinguishable themes apparent from the previous two coding steps allowed the researchers to focus in on concepts and findings tailored to the research [33]. In connection with the selective coding process, specific effort was directed towards identifying strong examples for select themes that effectively represented the findings of the research.

4 RESULTS & DISCUSSION

30 interviews were conducted over the course of six months and were then analyzed according the proposed methodology. Figure 1 shows demographics for individual respondents while Figure 2 shows information for their companies. This sample of

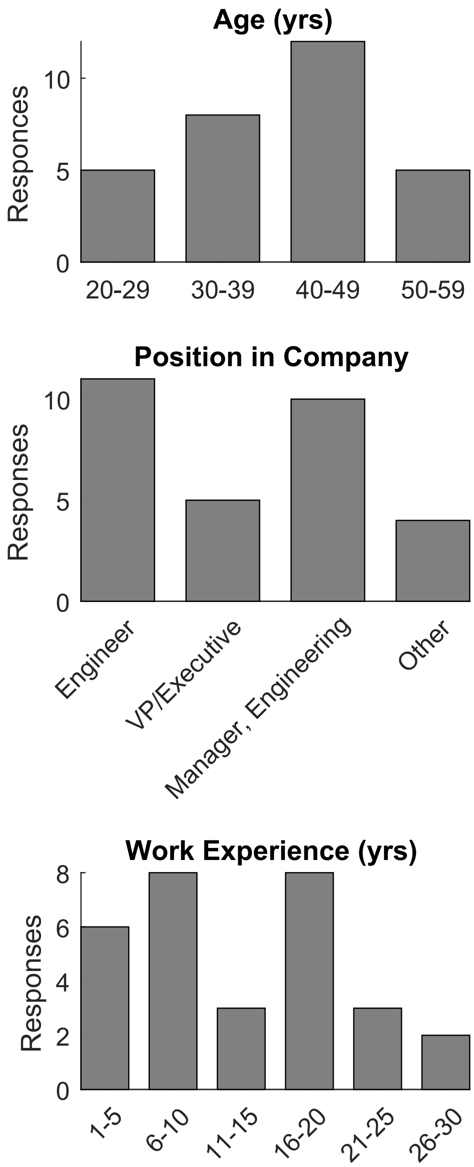


FIGURE 1: Demographics of individual respondents

30 individuals represents a diverse set of professionals/industries and is adequate to begin testing our hypotheses.

The following sections are segmented by each hypothesis with an accompanying section for the results related to that hypothesis. Immediately following the results is a brief discussion for each hypothesis regarding the findings with observations from the interviews.

Hypothesis 1

Results: This hypothesis states that ”Companies do not have processes in place to consider the social impacts of their

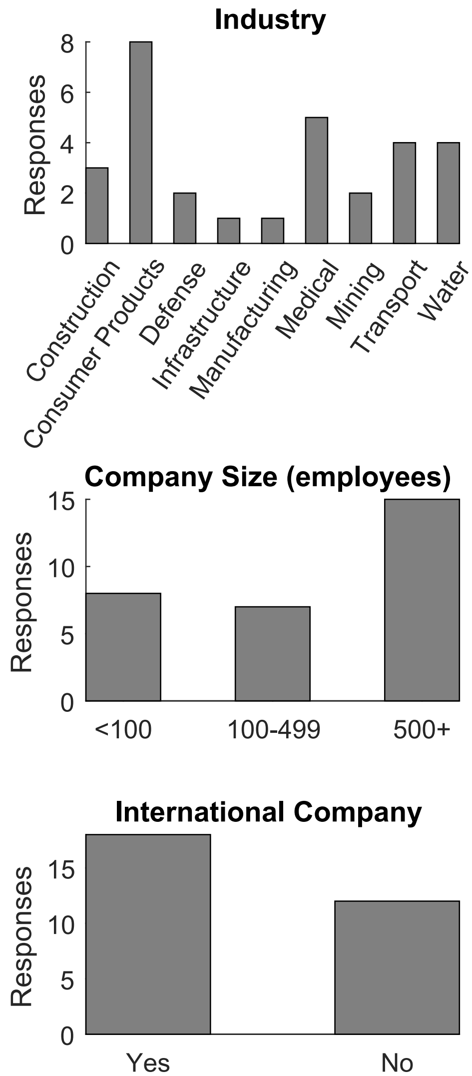


FIGURE 2: Demographics of representative companies

products”. Counter to the initial hypothesis, 96.6% of the interview respondents answered affirmatively when asked if they consider the social impacts their products will have when designing them. It turns out the majority of companies interviewed do have some processes in place to consider the social impact of their products.

Discussion: This is overwhelming evidence showing that the hypothesis is proven false. The nature of this question required a binary response of if the company does or does not have at least one process to consider social impact. That is to say, 96.6% of the respondents consider social impact at least to some extent while it will be shown in further discussions that simply the existence of a process does not always equate to a rigorous consideration of social impact.

Despite varying levels of consideration, the fact that nearly all respondents are concerned about the social impacts of their products is very promising. The field will most likely only become more centralized as corporations, stakeholders, and consumers begin to demand socially responsible practices. A further discussion of the types of processes used by these companies is found in section 4

Hypothesis 2

Results: An extension of hypothesis 1 is that if social impacts are considered, it is only those that have a direct health or safety impact. This second hypothesis allows a deeper analysis of the interviews and shows to what extent the full breadth of social impact is being considered. When asked what impacts they considered, respondents would offer several different categories from a list of options provided. Every respondent identified at least two separate impact categories while most respondents identified more. Despite bringing up many different types of impacts, however, the general focus of their conversation remained on health and safety.

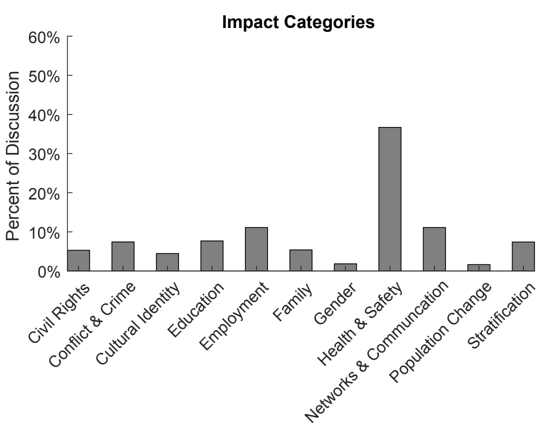


FIGURE 3: Percent of social impact considerations in each category

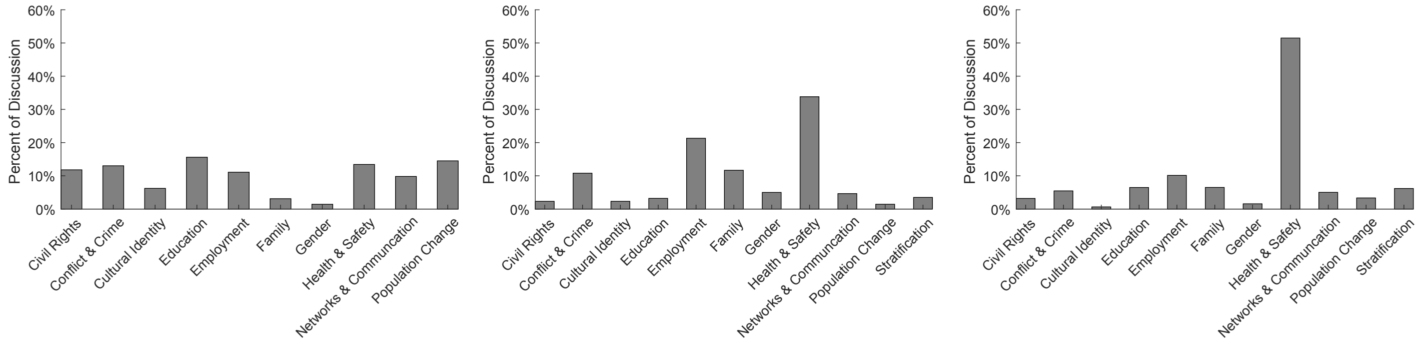
Figure 3 depicts, by word count, the amount each impact category was discussed as a percentage of all impact category discussions. This figure reveals that 36.7% of social impact category conversations were focused on health and safety, with the next most talked about topic being employment at 11.1%. Meaning that respondents are almost three times more likely to talk about the health and safety impacts of their products over any other impact the product may have.

When the data behind Figure 3 is explored more deeply, a disconnect begins to appear between front-line engineers, engineering managers, and executives. The data as shown in Figure 4, shows that executives spent more of their conversations disusing other impacts instead of focusing so heavily on health and safety. Please note that the sample size for each subgroup is very small with only 5 executives being represented (refer to Figure 1). The standard deviation of the data when filtered for the responses of executives only (Fig 4a) is 4.9%. Conversely, the engineer appears to more heavily emphasize health and safety considerations. The standard deviation for data relating to the engineers (Fig 4c) is 14.3%. The response for managers appears to be a mix of both engineers and executives, not as irregular as the engineers, but also not as consistent as the executives. The standard deviation for manager's data (Fig 4b) is 10.1%. Figure 5 plots the standard deviation of the data for each position mentioned above.

Discussion: An under-emphasis on impacts outside of health and safety could be occurring because these impacts are perhaps more recognizable than any other, or that the engineering tools to consider it are well developed. Respondents agreed that impacts regarding health and safety are regulated by governments and industry standards more heavily than any other category, which may have an impact on a company's responsibility to consider it. Additionally, the role of a professional engineer is often to ensure the designs for products, systems, and structures are safe and may cause other impacts to be under emphasized.

Regardless of why responses focused on health and safety, nearly all products have far more impacts than this. For example, the impact of home appliances on gender stereotypes and family relationships is well documented [8]. Home appliances such as electric irons, gas-powered ovens, and washing machines can have serious safety implications if carelessly designed, but tools and discussions to help consider impacts on gender stereotypes and family relationships may have helped discover alternative designs as well. Additional processes need to be developed in order to bring more balance to the under-served categories, such as education or conflict & crime. This may help engineers understand the full scope of possible impacts their product may have.

Executives tend to have a more holistic view of what impacts are important to their company with a standard deviation almost a third of the size of the engineers data. The disconnect between upper level management and their engineers is evident in the data. The hierarchical structure that is commonplace in many well-established companies appears to dilute the vision and goals by the time it reaches the engineers. Removing the health and safety category from the engineer's data reveals how emphasized it is as the standard deviation for engineers drops to 2.7% in this scenario. Standard deviations for all three segments without health and safety data can be found in Figure 6.



(a) Executives (b) Managers (c) Engineers

FIGURE 4: Percent of social impact considerations segmented by job title

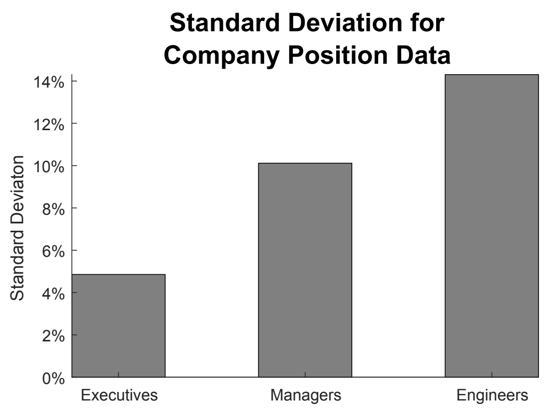


FIGURE 5: Standard deviation for data on impact consideration, for three separate positions in a company

FIGURE 6: Standard deviation for data on impact consideration with the health and safety data removed, for three separate positions in a company

Hypothesis 3

Results This hypothesis states that engineers have little to no tools to measure the social impact of their designs. All the processes discussed were categorized as either ”measurable” or ”non-measurable”. If the process had a clear quantifiable value as an output then it was considered measurable. Figure 7 shows the proportion of measurable to non-measurable processes discussed by the respondents.

78.1% of the discussion on processes were regarding unquantifiable processes. Most common among those that were measurable was Design Failure Modes and Effects Analysis (DFMEA) which is a common tool to consider the safety of a given product.

Discussion This furthers the dialog that engineers have insufficient means to understand and predict the impacts of their products. In most cases, the non-measurable processes required a large amount of intuition in order to determine if the breadth and depth of the impact consideration was sufficient.

Hypothesis 4

Results This hypothesis was stated as ”There are only specialized measurement tools for very specific impacts”. While many respondents showed great enthusiasm for the types of social impact they consider, the data uncovers a surprising lack of coverage with their processes. Figure 8 shows that the majority of conversations about what specific processes were used resulted in a discussion regarding a lack of processes. ”Lack of Process” took up 56.4% of the discussion with industry specific processes taking 26.1%. ”Industry Specific” processes are ones that are considered too specialized to be useful outside of that industry. Checklists and DFMEA may be industry agnostic, but they combine for only 13.4% of the processes discussed. Most checklists were developed within the company to ensure compliance with government regulations.

Discussion This confirms hypothesis 4 as the majority of processes discussed are only usable in the respondent’s specific

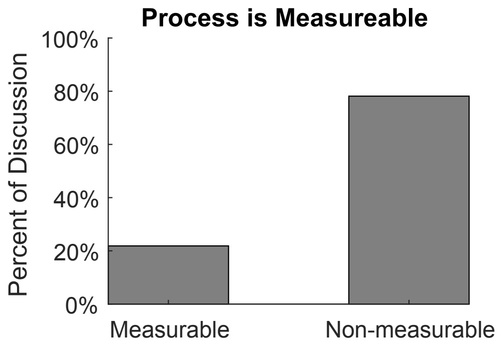


FIGURE 7: Proportion of all processes discussed that are measurable

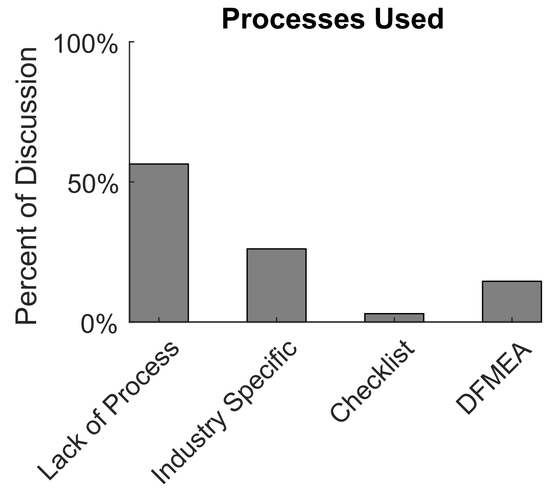


FIGURE 8: Proportion of conversation time spent on social impact processes

industry. Additionally, while checklists and design failure modes and effects analysis (DFMEA) are also used, only DFMEA arrives at a quantifiable value potentially useful in cross product/industry comparison. Even some of the most common social impact processes found in literature (SIA, SLCA) are not found among the list practices currently applied to products in industry.

This is a common problem for those desiring to quantify social impacts. To relate this to other pillars of sustainability, there are no measurements for social issues similar to dollars for economic issues, or CO_2 emissions in environmental impacts. Whether a measure such as this is desirable or useful for social impact is beyond the scope of the current paper. The lack of a widely accepted measurement causes difficulty in comparing true impact of a product both positively and negatively.

The difference between predictive and evaluative processes was an important distinction for the interviews. Predictive processes were generally specific to an industry and had little value in comparison across different industries or even across different products within an industry. The exception to this was DFMEA which has been used extensively in design activities for years.

5 CONCLUSION

Current social and political trends may be causing more individuals to care about the social impacts of products, services, and regulations. Despite this, engineers appear to lack the necessary tools to consider the breadth and depth of possible impacts relating to their products. This is true in two ways; 1) design engineers do not equally consider the whole spectrum of impacts that their product could potentially have, and 2) the tools necessary to quantify the level of impact a product has are either non-existent or severely underdeveloped across industries.

Further research should be pursued to confirm these results with a larger set of companies. Additionally, steps should be taken to make processes designed for assisting engineers in this manner should be made more readily available to engineers in industry. If they are available, and engineers choose not to adopt, then the process should be altered to be more efficient and easy to use.

From these interviews it appears that intuition is the basis for most social impact related decisions. This may explain why engineering projects for the developing world have difficulty, the engineers may be relying on intuition for a context they have little, if any, experience with. Progress can be accelerated as proper tools and measurements are developed and made available to engineers in industry and not just in academia. While it may be true that sophisticated processes exist to help engineers consider the breadth and depth of their products impacts, we may be skeptical as to how widely spread these processes are for practicing engineers. Even if there are a handful of companies out there with these processes in place, these interviews indicate that the majority of organizations likely have a desire to consider social impact more fully, but lack the necessary tools to do so in a rigorous manner.

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REFERENCES

[1] Alwi, S. R. W., Manan, Z. A., Klemeš, J. J., and Huisingh, D., 2014. Sustainability engineering for the future. 1

[2] Perl, J., 2016. *Sustainability Engineering: A Design Guide for the Chemical Process Industry*. Springer. 1

[3] Tejedor, G., Segalàs, J., and Rosas-Casals, M., 2018. "Transdisciplinarity in higher education for sustainability: how discourses are approached in engineering education". *Journal of Cleaner Production,* ***175***, pp. 29–37.

[4] Brundtland, G. H., 1987. *Report of the World Commission on environment and development: "our common future"*. Oxford University Press. 2

[5] Burdge, R. J., 2004. *A community guide to social impact assessment*. Social Ecology Press. 2

[6] Elkington, J., 2004. "Enter the triple bottom line". In *The Triple Bottom Line: Does it all Add Up?*, Vol. 11. pp. 1–16. 2

[7] Buchert, T., Neugebauer, S., Schenker, S., Lindow, K., and Stark, R., 2015. "Multi-criteria decision making as a tool for sustainable product development - Benefits and obstacles". *Procedia CIRP,* ***26***, pp. 70–75. 2

[8] Rainock, M., Everett, D., Pack, A., Dahlin, E. C., and Mattson, C. A., 2018. "The social impacts of products: a review". *Impact Assessment and Project Appraisal*, pp. 1–12. 2, 3, 5

[9] Ottosson, H., Hirschi, E., Mattson, C. A., and Dahlin, E., 2017. "A Simple Starting Point for Designing for and/or Assessing the Social Impact of Products". In ASME 2017 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference, American Society of Mechanical Engineers, pp. V02BT03A015—-V02BT03A015. 2

[10] Mattson, C. A., and Wood, A. E., 2014. "Nine principles for design for the developing world as derived from the engineering literature". *Journal of Mechanical Design,* ***136***(12), p. 121403. 2

[11] Mahmoudi, H., Renn, O., Vanclay, F., Hoffmann, V., and Karami, E., 2013. "A framework for combining social impact assessment and risk assessment". *Environmental Impact Assessment Review,* ***43***, pp. 1–8. 2

[12] Esteves, A. M., Franks, D., and Vanclay, F., 2012. "Social impact assessment: the state of the art". *Impact Assessment & Project Appraisal,* ***30***(1), pp. 34–42. 2

[13] Jørgensen, A., Bocq, A. L., Nazarkina, L., Hauschild, M., Le Bocq, A., Nazarkina, L., and Hauschild, M., 2008. "Methodologies for Social Life Cycle Assessment". *International Journal of Life Cycle Assessment,* ***13***(2), pp. 96–103. 2

[14] UNEP Setac Life Cycle Initiative, 2009. *Guidelines for Social Life Cycle Assessment of Products*, Vol. 15. 2

[15] Siebert, A., Bezama, A., O'Keeffe, S., Thrän, D., Keeffe, S. O., and Thrän, D., 2016. "Social life cycle assessment: in pursuit of a framework for assessing wood-based products from bioeconomy regions in Germany". *International Journal of Life Cycle Assessment*, pp. 1–12. 2

[16] Gmelin, H., and Seuring, S., 2014. "Determinants of a sustainable new product development". *Journal of Cleaner production,* ***69***, pp. 1–9. 2

[17] Chhipi-Shrestha, G. K., Hewage, K., and Sadiq, R., 2015. "'Socializing' sustainability: a critical review on current development status of social life cycle impact assessment method". *Clean Technologies and Environmental Policy,* ***17***(3), pp. 579–596. 2

[18] Ma, J., and Kremer, G. E. O., 2015. "A Modular Product Design Method to Improve Product Social Sustainability Performance". In ASME 2015 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference, American Society of Mechanical Engineers, pp. V004T05A053—-V004T05A053. 2

[19] Stevenson, P. D., Mattson, C. A., Bryden, K. M., and MacCarty, N. A., 2018. "Toward a universal social impact metric for engineered products that alleviate poverty". *Journal of Mechanical Design,* ***140***(4), p. 041404. 2

[20] Svensson, M., and Gould, R., 2015. "Hurdles to Clear: Cognitive Barriers in Sustainable Product Development". In The 23rd Nordic Academy of Management Conference, Copenhagen. 2

[21] Alsaffar, A. J., Raoufi, K., Kim, K.-Y., Kremer, G. E. O., and Haapala, K. R., 2016. "Simultaneous consideration of unit manufacturing processes and supply chain activities for reduction of product environmental and social impacts". *Journal of Manufacturing Science and Engineering,* ***138***(10), p. 101009. 2

[22] Schöggl, J.-P., Baumgartner, R. J., and Hofer, D., 2017. "Improving sustainability performance in early phases of product design: A checklist for sustainable product development tested in the automotive industry". *Journal of Cleaner Production,* ***140***, pp. 1602–1617. 2

[23] Pack, A. T., and Mattson, C. A., 2017. "An Assessment of Village Drill Sustainability, With Recommendations". In ASME 2017 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference, American Society of Mechanical Engineers, pp. V02BT03A013—-V02BT03A013. 2

[24] Garay, L., and Font, X., 2012. "Doing good to do well? Corporate social responsibility reasons, practices and impacts in small and medium accommodation enterprises". *International Journal of Hospitality Management,* ***31***(2), pp. 329–337. 2

[25] Short, T., Lee-Mortimer, A., Luttropp, C., and Johansson, G., 2012. "Manufacturing, sustainability, ecodesign and risk: lessons learned from a study of Swedish and English companies". *Journal of Cleaner Production,* ***37***, pp. 342–

352. 2
[26] Rapley, T. J., 2001. "The art (fulness) of open-ended interviewing: some considerations on analysing interviews". *Qualitative research,* ***1***(3), pp. 303–323. 3
[27] Emmel, N., 2013. *Sampling and choosing cases in qualitative research: A realist approach*. Sage. 3
[28] Suri, H., 2011. "Purposeful sampling in qualitative research synthesis". *Qualitative Research Journal,* ***11***(2), pp. 63–75. 3
[29] Luker, K., 2008. *Salsa dancing into the social sciences*. Harvard University Press. 3
[30] Fereday, J., and Muir-Cochrane, E., 2006. "Demonstrating rigor using thematic analysis: A hybrid approach of inductive and deductive coding and theme development". *International journal of qualitative methods,* ***5***(1), pp. 80–92. 3
[31] Charmaz, K., 2014. *Constructing grounded theory*. Sage. 3
[32] Monette, D. R., Sullivan, T. J., and DeJong, C. R., 2013. *Applied social research: A tool for the human services*. Cengage Learning. 3
[33] Attride-Stirling, J., 2001. "Thematic networks: an analytic tool for qualitative research". *Qualitative research,* ***1***(3), pp. 385–405. 3