

## Continuous Monitoring of Gender Equality

The development of a counter-account system for the hospitality industry

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**Abstract** - Sustainability reporting has become common practice in organizations. A factor that is associated with the rise of sustainability reporting is greenwashing. To counter greenwashing practices, counter-accounting, referring to the use of information produced by actors outside a given organization or industry, aims to help verify statements made by organizations. Although counter-accounting already exists in the toolbox of the auditor, it is mainly applied in an ad-hoc manner and rarely continuous. In this study, a continuous monitoring system for counter-accounts is proposed to measure gender inequality. The usefulness of the system is demonstrated by analyzing 22075 job appointment announcements in the hospitality sector and 55 statements regarding organizations' efforts and goals in the field of workforce equality. The presented results shed light on occupational gender segregation and provide a basis from which more continuous counter-accounting systems can be developed. In this paper, we re-address and - present our earlier work, yet we extend the previous study with additional research by increasing the appointment announcement dataset from 1000 instances to 22075 and by adding an additional form of usefulness validation for the developed system. In addition, we provide a more detailed description of the related literature, findings, and results.

**Keywords** - continuous monitoring; hospitality sector; sustainability reporting; counter-accounting; continuous auditing; job titles; occupational gender segregation

### I. INTRODUCTION

Over the last few decades, social and environmental challenges have led to a push in organizations' sustainability-related activities. With regard to this topic, we extend our previous work presented in [1]. The consensus regarding organizations' shared responsibility to act in accordance with sustainable purposes for all stakeholders resulted in increased regulations and policies [2] and consequently, also growth in organizations' sustainability reporting. For instance, in 2020, 92% of the S&P 500 companies published sustainability reports or disclosures as opposed to only 20% in 2011 [3]. Such reports are an important part of the conversation between organizations and their stakeholders.

Simultaneously, parallel to the increased sustainability communication, skepticism has grown toward the

authenticity of such reporting [4]. A large body of research addresses how some organizations use such sustainability disclosures to "greenwash" in order to develop a more sustainable image and "window dress" corporate behavior [5][6]. Hence, greater emphasis has been placed on ensuring the reliability of corporate sustainability reporting. The growing awareness of the (lack of) reliability of such reports has, for instance, translated into the implementation of a standardized reporting framework with principles to define the content and the quality of these reports, as proposed by the Global Reporting Initiative (GRI) [7].

Despite this development, there still remains tension between corporate sustainability discourse and practice [5]. To address the critique regarding the credibility and reliability of sustainability reporting and to restore confidence in such disclosures, auditors and assurance providers are introduced to verify the statements made by the reporting organizations [7]. However, given the questioned honesty of corporate disclosures, it becomes increasingly more worthwhile to explore other accounts of organizational activities such as "counter-accounts", that are, contrary to voluntary published corporate reports, outside the control of the organization that is the subject of the account [8]. Counter-accounting through media such as the internet and social media contributes to verifying the organization's legitimacy as it provides an alternative representation of an organization with the aim to rectify otherwise harmful or undesired practices [6][8]. As previous research suggests, the use of counter-accounts should be further explored [6]. Specifically, to systematically include such counter-accounts when challenging organizations' operations, auditors are in need of an appropriate toolbox existing of a continuous monitoring system [9].

Whereas a continuous monitoring system would be useful to review organizations' disclosures with regard to each and every one of the United Nations' 17 Sustainable Development Goals (SDGs), this paper proposes a continuous monitoring system that addresses the fifth goal, gender equality. Specifically, an application of the system is provided for the hospitality industry, providing insights into occupational gender segregation by mapping the differences in the job titles fulfilled by male and female executives. The

research question addressed in this study is the following: “How can a counter-account monitoring system for gender equality in the hospitality industry be designed?”.

The remaining part of the paper is structured as follows. Section II provides a literature review on counter-accounts, occupational gender segregation, and available monitoring systems. In Section III, a description of the research method is presented. Section IV gives insight into the data collection and Section V describes the data analysis procedure. Section VI shows the results from the job title labels, the system architecture, the usefulness evaluation, and the gender quality results across job titles. Lastly, Section VII concludes the paper.

## II. LITERATURE

In 2015, all United Nations Member States endorsed the 2030 Agenda for Sustainable Development, a roadmap for peace and prosperity for both people and the planet, with 17 SDGs at its core [10]. After having defined these integrated, universal goals for sustainable development, the next step toward achieving them was to set specific targets for each goal, which were then in turn further broken down into measurable indicators. However, the incompleteness of the indicators, even after more than three years into the program, make tracking the progress toward meeting the SDGs challenging [11].

To assess whether the actions taken by countries and organizations to reach the SDGs are effective and in correspondence with their own reporting, scholars have argued the need to explore new Information, Communication, and Technology (ICT) in combination with multiple data sources to provide a common, continuous, and transparent representation of their efforts [11].

### A. Counter-accounts

As sustainability becomes an indispensable topic on corporate agendas, growing skepticism toward the authenticity of organizations’ sustainability reporting arises. This calls for effective monitoring and auditing in this environment in order to ensure the trust and credibility of the information contained in such reports.

With the acceleration of available, real-time information flows, the “archival audit”, where the auditor evaluates organizations’ yearly reports, is complemented if not replaced by a more real-time evaluation called “continuous auditing” [12]. Together with continuous monitoring, which is described as an ongoing management process to monitor internal controls, continuous auditing aims to provide the organization with a reasonable level of objective assurance [13].

Aside from introducing a continuous monitoring mechanism to provide assurance on these reports and the organizations behind them, scholars have argued the need to explore other accounts, or “counter-accounts”, that are outside the control of the respective organization [8]. Counter-accounts are defined as accountings that challenge

the representation established by the subject organization and contribute to critically assessing the organization’s corporate accountability or lack thereof [6].

### B. Occupational gender segregation

Over the past decades, one of the most pressing social issues is inequality [14]. Previous research linked inequality to the emergence of free-market capitalism in which, at a macro-level, organizations and those working for them remain rather invisible. Viewing organizations as rational entities with neutral structures and practices is particularly problematic when addressing inequality as they play a vital role in people’s daily lives, such as employment and other opportunities that in turn impact their social and economic status [15][16]. Therefore, equality plays a central role in many of the SDGs.

Inequality is shown in a broad range of forms, however, this paper focuses on gender equality, the fifth United Nations SDG. A recent study commissioned by the European Parliament’s Policy Department for Citizens’ Rights and Constitutional Affairs [17], shows not only a difference in the share of employment between working-age men (79%) and working-age women (67%) but also that those women who are employed, are on average paid 14.1% less per hour compared to their male counterparts.

The gender gap, with its key dimension being the gender pay gap, has a considerable impact on individuals’ socioeconomic status since gender equality contributes to both economic growth and sustainable development [17]. Evidently, aside from being listed as one of the United Nations SDGs, gender equality is also addressed by the European Commission in the 2020-2025 Gender Equality Strategy, which strives for equal access to the economy across genders. In addition, the European Parliament in 2021 called for a new gender pay gap action plan, addressing women’s accessibility to study and work in male-dominated sectors, more flexible work arrangements, and improved wages in female-dominated sectors.

According to Blackburn and Jarman [18], the topic of occupational gender segregation has been at the heart of the gender inequality debate due to its significant role in the gender pay gap and career constraints. Occupational gender segregation refers to a phenomenon in which occupations are stereotyped according to gender. For example, as shown in a study by He et al. [19], women are more represented in occupations that are characterized by high warmth and low competence. For example, statistics show that women in the European Union, in general, tend to be overrepresented in service industries, and professional fields like the arts and humanities, whereas they tend to be excluded from fields like science, technology, engineering, and mathematics [17]. These occupational stereotypes have a widespread effect on how workers are distributed across different jobs. For example, with respect to people’s career choices, they may opt for an occupation whose stereotyped attributes are corresponding with their self-perceptions. Similarly,

regarding prejudice and discrimination, preconceived notions about individuals, that are not based on reason or reality, may lead to unjust and differential treatment of certain social groups [19]. As a result, the gendered division of the labor market largely explains the gender pay gap due to women's overrepresentation in lower-paid sectors and women's difficulty accessing other, higher-paid sectors [17].

The presence of occupational gender segregation and its role in gender inequality has been widely addressed [18][19][20], yet there remains little work on the monitoring and auditing process of occupational gender segregation. Therefore, this paper proposes a continuous monitoring system for counter-accounts that allows auditors to map both the current state of gender division across different jobs and their evolution over time.

### C. Continuous monitoring systems

Monitoring statements and claims organizations communicate on the one hand, and monitoring counter-accounts related to the statements on the other hand can provide valuable insights and prevent greenwashing and/or brownwashing [8]. Multiple studies have focused on analyzing such statements and their counter-accounts. For example, Perkiss et al. [6] analyze counter-accounts and responses by various groups to challenge Nestlé on its sustainability actions. Although data analysis is conducted during these studies, commonly the research is performed once, and is singular problem-oriented, meaning that a specific study focuses on one organization and/or one problem, and executes the analyses once for the purpose of the study [21]. At the end of the studies, there is no information system in place that continuously monitors organizations' claims and related external data to compare both. Some examples of previous studies in which continuous monitoring systems have been developed concern the analysis of stock prices [22] and political analyses [23]. Also, research has been conducted that focus on extracting the right information from texts to be able to conduct the analyses [22]. Information systems that “*enable independent parties to provide assurance on a subject matter, using a series of reports, issued simultaneously with or a short period of time after, the occurrence of events underlying the subject matter*” are called Continuous Monitoring Systems. In general, such systems are used automatically to monitor internal controls within business processes [22].

However, two changes in the current business environment force organizations to start continuous monitoring of external sources. The first change is that organizations are exposed to increased requirements in terms of regulations and business objectives that require managing and monitoring the entire value chain [24]. Second, organizations more and more have to deal with actors that provide counter-accounts through the monitoring of external sources that provide statements about the organization. The focus of this study is automated continuous monitoring of gender equality across job titles and the challenges that occur.

To overcome these challenges a system architecture is proposed and its application is presented. Similar to previous research, we consider Named Entity Recognition (NER) as the basis of our counter-accounting system [22][25].

## III. METHODOLOGY

The research problem addressed in this study concerns the establishment of an automated, continuous monitoring system for gender equality in job titles. The need for such a system is a consequence of the growing need for organizations to comply with the various laws and standards implemented in the field of sustainability reporting. To be able to continuously monitor gender equality in an automated manner, an information technology artifact must be built. A research methodology that focuses on the development and performance of artifacts, specifically with the intention to improve them, is design science research [26][27]. Therefore, a design science approach is employed to perform this study. Although different authors propose different approaches to executing design science research, consensus exists on the following method to execute such a study: awareness of the problem, suggestion, development, evaluation, and conclusion. As stated by Kuechler et al. [28]: “*the research process frequently iterates between development and evaluation phases rather than flowing in waterfall fashion from one phase into the next.*” Design research is therefore a continuous cycle of building and evaluation, making it practically impossible to measure all elements of the designed artifact and/or related theories in one study [27]. Regarding the counter-accounting system, multiple elements need to be built and evaluated. Examples of these components are the job classification component, the job analysis component, and the overall system (architecture). The main task of the counter-accounting system is to show how job titles are distributed across gender. If the system is unable to perform this task it is useless. Therefore, in this study, we perform the first iteration of the building and evaluation cycle. Specifically, we focus on the mutual exclusivity and completeness of the job titles (goal 1), the development of a system that can map and monitor how those job titles are distributed across gender (goal 2), and the use and usefulness of the system in relation to the organizations' current report content (goal 3).

The first goal, ‘*create a mutually exclusive and complete list of job titles*’, requires the development of a framework in which job titles are listed and classified. To achieve this goal, a research approach is needed in which job titles are identified, compared, and standardized. Therefore, an inductive approach is chosen. Through grounded theory-based data collection and analysis [29][30], we search for job titles and their relationship to each other. This study design will strengthen the validity of the results as it enables the possibility to compare and combine existing knowledge with observations from practice [29]. The inductive approach is suitable for this research objective given that an industry-wide standard for job titles is not available or adhered to by hospitality organizations. Therefore, based on the job titles used in the appointment announcements posted

on the internet, a standardized list of job titles can be induced. Furthermore, grounded theory-based data collection is selected because, to the knowledge of the authors, most research around job titles focuses on the perspective of job titles mentioned in job advertisements and human resources systems rather than the perspective of job appointment announcements. In total 81 iterations of open coding and axial coding with multiple cycles of ordinal comparison have been conducted. The entire research process is visualized in Figure 1, with the above-described procedure for the first goal depicted in the upper section; ‘Goal 1’.

To reach the second goal, ‘the development of a system that can map and monitor how those job titles are distributed across gender’, a research technique is needed that can compare job titles that are more characteristic to males or females than others in a collection of job appointments. A technique that is used to [31] “extract words and phrases that are more characteristic of a category than others in a text corpus” is Scattertext [32][33][34][35][36]. Based on Scattertext we created an experimental setup (pilot) of the system (architecture) to see if it is possible to create a report that can counter account organizations’ claims based on open source.

Although the start of design science research is “the identification of a challenging problem or opportunity in an interesting application environment,” [28] which in this case is the need for organizations to comply with the various laws and standards implemented in the field of sustainability reporting, this study aims to complete a third research goal, namely, ‘to measure the usefulness of the artifact (Scattertext architecture) in providing answers to these new laws and standards.’ Specifically, to evaluate the use and usefulness of the developed Scattertext system, its results should be compared against the organizations’ current reporting content, which it aims to counteract. To accomplish this goal, data needs to be extracted from the hotel chains’ annual/integrated/sustainability reports. Therefore, an inductive approach is chosen. Through grounded theory-based data collection and analysis [29], we search for statements regarding workforce equality and their relationship to each other. This data analysis process consisted of two coding cycles. Specifically, the report analysis involved 1 iteration following a cycle of (1) open coding and (2) axial coding. During the open coding cycle, 55 statements regarding organizations’ efforts and goals in the field of workforce equality have been identified and coded as such. The axial coding cycle focused on identifying relationships among the statements and forming unique categories within the topic of workforce equality that are addressed by organizations in their reports. As can be seen in Figure 1, following the first research goal, the results of the coding cycles (‘GOAL 3’) are compared to the results produced by the current version of the system (‘GOAL 2’) to evaluate the usefulness of the system in relation to the current reporting content.

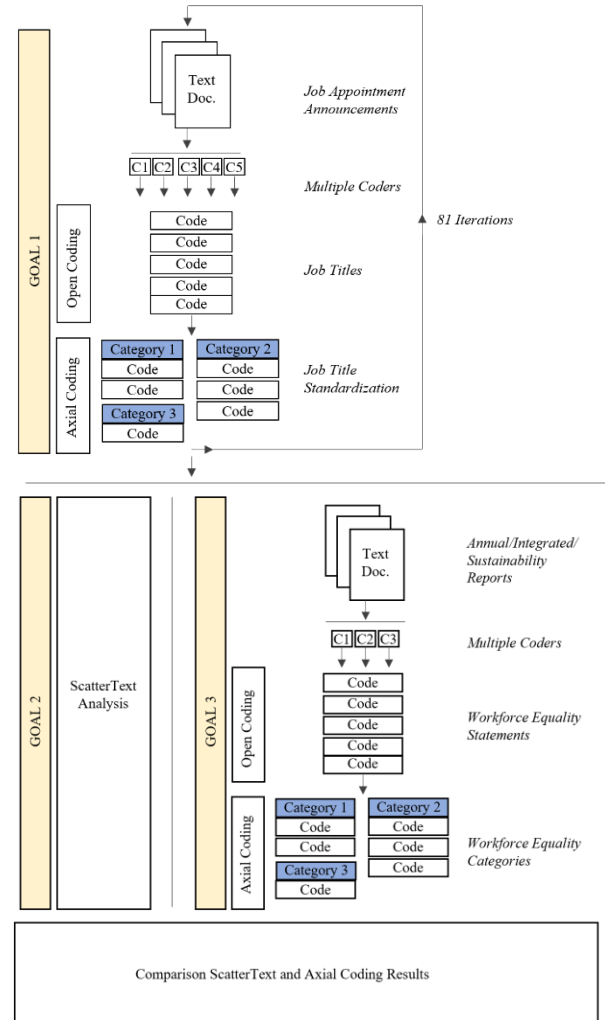


Figure 1. Full Research Process Visualization

#### IV. DATA COLLECTION

Grounded theory states that the first selection of respondents and documentation is based on the phenomenon studied by a group of individuals, organizations, information technology, or community that best represents this phenomenon [29]. With the first goal of this study being the creation of mutually exclusive, complete, and useful labels for job titles, the currently used job titles must be collected. In our case, we collected job titles from two sources, with the main source being Hospitality.net and the second source being LinkedIn. From Hospitality.net we collected appointment announcements from which the job titles could be derived. The collected data has been posted between the 19<sup>th</sup> of April 2011 and the 25<sup>th</sup> of August 2022. The data collection started with a batch collection of 1652 announcements forming the base of the job title dataset. Subsequently, daily new appointment announcements were collected, leading to a total of 22075 announcements.

Design research states that after the artifact is built, it needs to be measured on predefined elements. In this research, the focus is on usefulness. Since usefulness is considered a prerequisite for the intent to adopt a specific system [37]. Usefulness in this study is defined as the degree to which the counter-accounts monitoring system can measure and either confirm or counter-act the statements made by the hotels. Therefore, in this research, documents are needed in which hotel chains make formal statements about gender equality in their hotels. Organizations provide such information in their annual reports, integrated reports, and/or sustainability reports. We have collected a total of 77 reports. The unit of analysis in these documents is every statement made about equality in the workforce.

## V. DATA ANALYSIS

Data analysis for the first goal: *'create mutually exclusive, complete, and useful categories'*, was conducted in 81 iterations following two cycles of coding, namely (1) open coding and (2) axial coding with multiple cycles of ordinal comparison. The coding procedure has been completed by a group of five researchers, each having a hospitality education background. During the first cycle, the open coding, job titles were identified and extracted from the collected appointment announcements and coded accordingly. This resulted in a total of 6201 different job titles. Due to the extent of the list, the complete list of job titles has not been added to the paper, however, a snapshot can be found in Table I.

TABLE I. SNAPSHOT JOB TITLE LIST FROM HOSPITALITY.NET ANNOUNCEMENTS

Job Title
CEO
CFO
General manager
Hotel manager
Director
Director of sales
Chef de Cuisine
Senior Vice President
Spa Director

After the open coding was finished, axial coding has been applied. The collection of job titles revealed a wide variety and inconsistency among them. To combat this disparity and allow for comparison, the second cycle of coding, axial coding, is performed to identify more precise categories and relationships within the data. During axial coding, different job titles describing the same 'job' have been coded to represent this. For example, the role of *'Chief executive officer'* is described in appointment announcements as *'CEO'*, *'New company CEO'*, *'Chief executive officer'*, and multiple other variations as can be seen in the example in Table II. The standardized labels were determined using both the

hermeneutic skills of the researchers involved and the job description information that described the job content. Whereas the determination of standardized labels was straightforward for many job titles, such as the *'Chief Executive Officer'* presented in the example (Table II), also less obvious axial codings have been encountered. For example, the difference between an area manager, multi-property manager, group manager, and regional manager. In some cases, an area manager had the area Australia whereas others had the area Washington DC. These differences had to be discussed and registered to allow for consistent, mutually exclusive labeling. In these cases, the coding families of grounded theory have been applied to standardize the job titles, specifically, the dimension family type. Moreover, certain job titles were decided to be removed from the dataset. The reason for omitting certain titles was due to them being non-management level jobs such as *'Associate'*, *'Secretary'*, and *'Mixologist'*, award appointments, or appointments of jobs that are unique to certain hotels like the *'Duck Master'* at the Peabody in Memphis [38].

TABLE II. EXAMPLE JOB TITLE STANDARDIZATION

Standardized Job Title	Job Title
Chief Executive Officer	CEO
	Interim CEO
	Chief Executive
	Acting CEO
	CO-CEO
	Chief exe. Officer
	New Company CEO

To create mutually exclusive, complete, and useful labels a procedure had to be adopted among the coders. Specifically, after the first round of open and axial coding, coded parts were discussed among the coders to understand the process and agree on how certain elements had to be coded. Each of the five coders coded all elements and for those elements that were not consistently coded, they discussed their reasoning until they agreed upon a certain label. The unique coding as well as the business rules leading to this coding have been codified in patterns for a rule-based matcher engine. An example of such a pattern included in the matcher engine is *'director of people and culture'* leading to the label *'Director of Human Resources'*: {"label": "Director of Human Resources", "pattern": [{"LOWER": "director"}, {"LOWER": "of"}, {"LOWER": "people"}, {"LOWER": "and"}, {"LOWER": "culture"}]}. After this first round, 80 additional rounds of coding have been conducted in which the rule-based matcher engine was used as an additional coder. The process of this worked as follows. First, the rule-based matcher engine coded the new job title, which could lead to two results. The first result would be the matcher engine assigning a standardized job title label, whereas the second result would be labeling the element with a '999'

classification. In the first case, the coders would compare the coding of the rule-based matcher engine to what they would have coded the job titles as. In the second case, the rule-based matcher engine can not propose a label for that certain job title, and the coders must label it themselves. After the coders have agreed upon the label, a new rule is added to the pattern file and fed to the matcher engine. After 81 rounds of coding, the matcher engine no longer returned any ‘999’ classifications, meaning the current job titles in the dataset could be successfully labeled to one of the standardized job titles.

With regards to the second research goal: ‘*the development of a system that can map and monitor how those job titles are distributed across gender*’, Figure 3 and Figure 4 show a visualization (ScatterText) of the job title dataset. A Scattertext system shows what words and phrases are more characteristic of a category than others. The X-axis and Y-axis indicate the term frequency in male and female job appointments, respectively. For instance, the upper-left area shows the job titles frequently appointed to women, while the lower-right area shows the frequently appointed job titles to men. Job titles that are presented in the middle are evenly distributed amongst male and female executives. To determine the gender of the person to whom the job title was appointed, the gender indication words in the appointment announcement are considered (e.g., *he/she/him/her*).

Finally, to evaluate the use and usefulness of the developed system, data needs to be extracted from the hotel chains’ annual/integrated/sustainability reports. This data

analysis process consisted of two coding cycles. Specifically, the report analysis involved 1 iteration following a cycle of (1) open coding and (2) axial coding. During the open coding cycle, 55 statements regarding organizations’ efforts and goals in the field of workforce equality have been identified and coded as such. For example, a statement saying “*We aim to increase representation of people of color in executive positions from 20.5% to 25% by 2025*” has been recoded to ‘*Racial Equality*’, whereas a statement like “*The percentage of female leaders shall be the same as the percentage of female employees*” has been coded to ‘*Man/Woman Parity*’. A snapshot of the axial coding of the statements can be found in Table III.

## VI. RESULTS

The result of the research is discussed in four sections. First, the results of the patterns and labels are discussed. Next, the current system architecture is explained. Following that, the system’s usefulness to counteract on the organizations’ formal statements is discussed. Lastly, the overall results on the male/female parity across job titles are reviewed.

### A. Pattern and Label Results

As described in the Data Analysis Section, in order to create standardized, mutually exclusive job title labels, the business rules defining labels had to be codified in patterns. These patterns include a word or a combination of words that are assigned a predefined label. The 81 rounds of coding resulted in a total of 1266 patterns which were fed to the

TABLE III. AXIAL CODING EXAMPLE OF WORKFORCE EQUALITY STATEMENTS

Label	Statement
Man/Woman Parity	“We aim to increase representation of people of color in executive positions from 20.5% to 25% by 2025.”
Racial Equality	“Our talent management team is working with leadership to identify ways to help high-performing Black employees advance within their careers and to broaden our sources of Black recruitment.”
Man/Woman Parity	“We are very close to reaching the goal of gender equality in top management roles: 46% female executives.”
Racial Equality	“We promote pluralism of origins and seeks diversity through recruitment and career management.”
Man/Woman Parity	“At the executive levels, we have achieved 100% gender equity and below our executive levels we have achieved 95% compared to the external marketplace of 80%.”
L.G.B.T.Q.I.A.+	“We support LGBT-owned businesses and spent \$4+ million with these businesses in 2020.”
Equal Compensation	“Ratio of average base salary for women to average base salary for men: 87,5%.”
Disability Equality	“We now employ 47 differently abled persons across business, and continues to guide industry initiatives to create inclusive workplaces.”
Man/Woman Parity	“Currently, more management roles are held by men (56 percent) than women (44 percent), and more than two-thirds (70 percent) of top management positions are occupied by men.”

matcher engine. These patterns included a total of 323 unique job titles. An example of the patterns can be found in Table IV.

Whereas the current pattern list covers the job titles presently occurring in the data, it should be considered that new titles, such as ‘*vice president sustainability*’ or ‘*vice president happiness*’, and new title variations, like the example in Table II, will appear as the data collection continues over time. A process is in place to facilitate such pattern list adjustments. Specifically, when a new title arises, the matching engine will simply return a ‘999’ classification, after which the coders can decide on a label for the job title and add it to the pattern list.

TABLE IV. PATTERN LIST EXAMPLE

Label	Pattern
Area Director of Sales and Marketing	area director of marketing
Area Director of Communications	apac media relations
Chairman of the Board of Directors	chairperson
General Manager	hotel manager
Senior Meeting and Events Manager	senior weddings department man.

### B. System Architecture

Part of the design science research process is the development of a system architecture in which the artifact’s structure is presented [39]. Having described the analysis of different system elements, the architecture to ground the counter-accounting system for gender equality as proposed in this study is visualized in Figure 2. The architecture includes three different sections (Collection, Cleaning, and Analysis & Visualization), which are each supported by a different tool (Selenium, Spacy, and ScatterText). The application of each section is discussed.

1) *Collection of counter-account data*: First, counter-account data, that can counter the statements made by the organization concerning gender equality, need to be identified and collected. For this application, external sources, that publish information on individual management-level appointments, should be consulted. The hotel chains themselves mainly report individual appointments on a board level, e.g., CEO, CFO, and COO as these are mandatory for investor relationships. In their annual reports, the organizations do not report on individual management appointments, therefore, other sources are needed that may serve as counter-account data. Within the hospitality industry, multiple sources, of different types, report on individual management appointments. The first type of

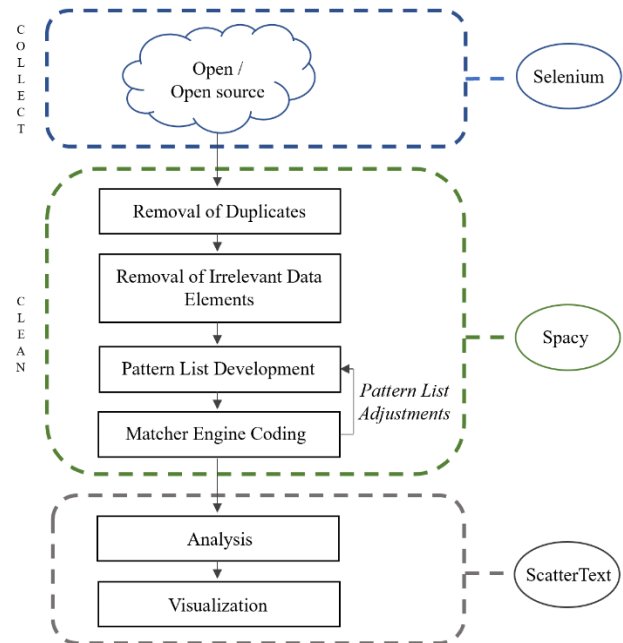


Figure 2. System Architecture: Continuous Monitoring System for Counter-Accounts

sources are websites that collect and publish management appointments such as Hospitality.net [40] and Lodging [41]. Related to this first type are professional network platforms like LinkedIn on which people indicate their current jobs. The third type of website provides global travel industry news and also reports on job appointments such as Hotel Management [42] and Travel News Asia [42][43]. The last type of website is tourism and newspaper websites, for example, Romania Journal [44] and Aruba Today [45]. The appointments per website can be collected by hand or using a variety of tools. For this specific research, Selenium, a tool for automated web scraping is employed to extract useful information from the identified sources, being the appointment announcements on employees’ new positions. Important to notice when applying these tools is to respect the privacy policies and the robot.txt files.

2) *Cleaning of counter-account data*: The second section of the system includes the cleaning of the collected counter-account data, existing of multiple steps. First, duplicate appointment announcements need to be removed. Those occur in the dataset when an appointment announcement is published on multiple sources. For example, one specific appointment [46] was announced at Hospitality.Net, TravelNewsAsia, AsianTravelTips, and Business Today. Consequently, after merging the collected data, those duplicates need to be removed. Aside from removing duplicates, other data-cleaning measures may be taken. For this system, it was decided to omit non-management appointments, award appointments, and appointments of

hotel-specific positions. Remaining with unique, management-level appointment announcements, the next cleaning step involves the coding procedure to bring the large number of variations in the job titles back to a manageable, standardized set of job titles. This step is important to allow for the gender comparison analysis across job titles. As described in detail in the Data Analysis Section, the coding procedure involved various rounds of coding resulting in the development of a pattern list. This pattern list is fed to a rule-based matcher engine. To automate this process, a tool called Spacy is used [25]. When the matcher engine returns an unlabeled job title, the pattern list can be adjusted by either adding a new label in the case of a new job title or labeling the title with an existing label in the case of a new title variation. This procedure accommodates the completeness of the job title labels over time. The last step is to remove all privacy-related information.

3) *Analysis and Visualization*: After having the data collected and cleaned, the following element of the system involves the comparative analysis of job titles fulfilled by males and females. To visually present the counter-account data, the system makes use of ScatterText [32]. The interactive scatter plot allows for comparison between job titles fulfilled by male and female executives. The longitudinal nature of the dataset allows for the evaluation of changes over the past 10 years and the potential identification of trends. The covered period per plot can thus be manually determined, however, for this research the gender comparison was performed per year. The ScatterText visualizations for 2011 (Figure 3) and 2022 (Figure 4) are presented below to review the most apparent changes over the past 10 years.

### C. System Usefulness

Having developed the artifact and presented its system architecture, the usefulness of the system should be evaluated. The outcome of the counter-account analysis can be of value to auditors and assurance providers in their assessment of the reporting organizations' credibility and reliability. For this application, this refers to the verification of statements made about gender equality efforts in the hospitality industry. As discussed in previous literature, equality has a broad range of dimensions, of which many relate to one another. To assess the extent to which the counter-account data could counter-act the reported equality statements, the statements are first codified according to their topic. Specifically, for this study, the hotel chains' statements on workforce equality were collected and analyzed following the two folded coding cycles as lined out in the Data Analysis Section. The results show that, within the hotel industry, the currently reported information on workforce equality could be categorized using six different labels as specified in Table V.

Considering the different categories of statements, it can be established that the developed counter-accounting system

mainly has counter-acting power regarding the 'Man/Woman Parity' statements. For example, organizations frequently report figures on man/woman representation across the workforce of which some also specify the man/woman representation on management levels. The developed counter-accounting system could not only provide insights into the man/woman representation but also shed light on what kind of positions are fulfilled by men and women. For example, when an organization proudly reports on achieving gender parity in management positions, the counter-accounting system may show how there are indeed an equal number of appointments to man and woman executives, but, there may remain occupational gender segregation. Specifically, the counter-account system may identify cases where organizations only reach their gender parity goals by promoting women in stereotyped positions, like 'Spa Manager', 'Sales and Marketing Manager', and 'Human Resources Manager'. In sum, the systems' usefulness currently focuses on the 'Man/Woman Parity' statements, painting a detailed picture of the real-life gender parity across job titles, however, its usefulness could potentially be expanded to different categories by collecting and analyzing different counter-account data.

TABLE V. CLASS LABELS FOR WORKFORCE EQUALITY STATEMENTS IN THE HOTEL INDUSTRY (2022).

Label
Man/Woman Parity
Racial Equality
Disability Equality
L.G.B.T.Q.I.A.+ Equality
Equal Compensation
Other

### D. System Results for Man/Woman Parity

As discussed, the system results could be viewed per organization and per year, however, for this study, the counter-accounting system is applied to the full dataset of appointment announcements in the hospitality industry. The results show an industry overview per year on how job titles are fulfilled by men or women. In this section, the results shown in Figure 3 (2011) and Figure 4 (2022) will be reviewed in more detail.

As can be observed in Figure 3 and Figure 4, with several job titles positioned more towards either the y-axis (female appointments) or the x-axis (male appointments), some of the stereotypes in occupational gender segregation could be identified. For example, in line with arguments in from He et al. [19] regarding women's presence in occupations characterized by high warmth and low competence and evidence showing women tend to be excluded from fields like science, technology, engineering, and mathematics [17], results in Figure 3 show job titles like 'Sales and Marketing Manager' and 'Spa Director' to be more frequently fulfilled





Figure 3. ScatterText Visualization of Gender Segregation on Job Title Level for Hospitality Industry (2011)

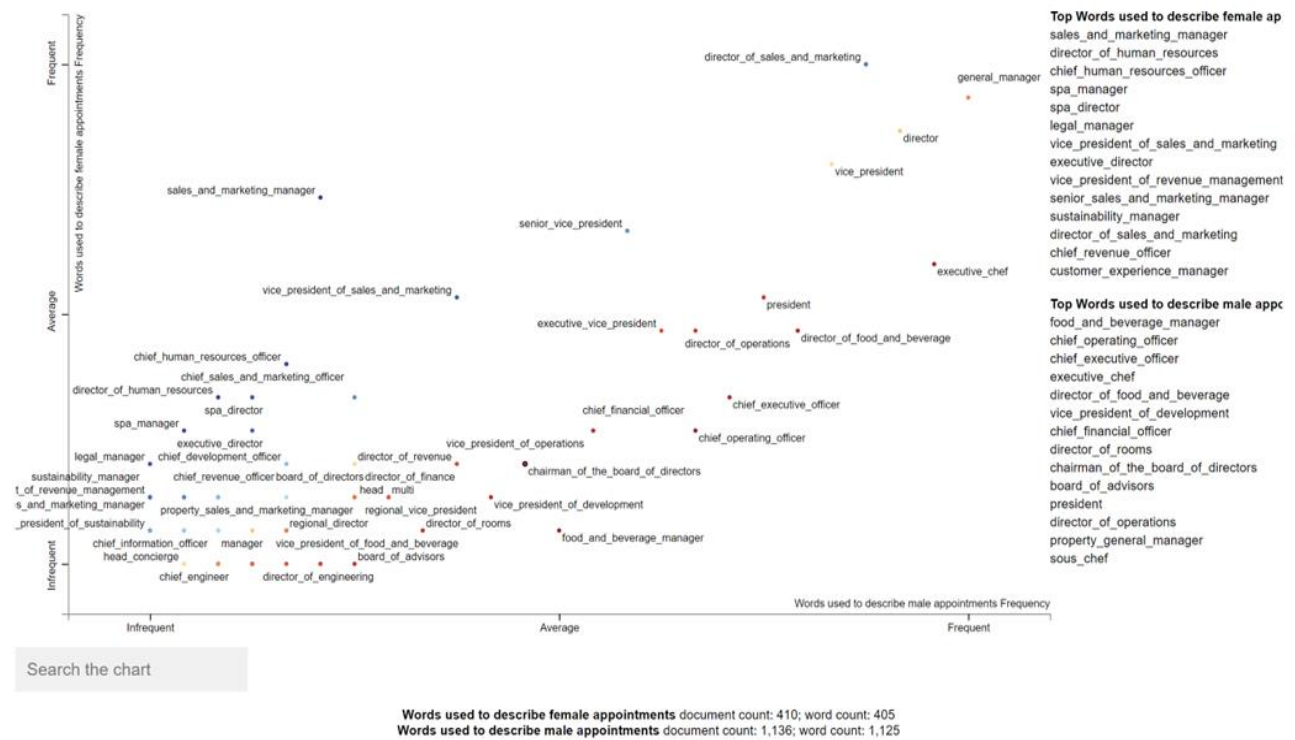


Figure 4. ScatterText Visualization of Gender Segregation on Job Title Level for Hospitality Industry (2022)

by females. On the other hand, job titles like ‘Chief Operating Officer’, ‘Chief Executive Officer’, ‘Director of Food and Beverage’, ‘President’, and ‘Chairman of the Board of Directors’ are substantially more often fulfilled by males. These results correspond with some of the preconceived stereotypes of gender division in the hospitality workforce, however, for some job titles, an equal gender division was already established ten years ago. For example, as shown in Figure 3, the position of ‘General Manager’ is approximately equally fulfilled by male and female executives.

When reviewing the current gender division in the hospitality workforce in Figure 4, some changes can be observed when comparing the division of titles with those in Figure 3. Some of the stereotypes can still be observed, of which some are even more pronounced. For example, aside from titles like ‘Sales and Marketing Manager’ and ‘Spa Director’, titles such as ‘Director of Human Resources’ became more frequently appointed to female executives. The position of ‘Executive Chef’ has been significantly more frequently fulfilled by Male Executives.

Despite the continued stereotyped gender division of some positions, a general trend could be observed, mostly for high-level positions, showing how certain job titles are moving towards a more linear relationship between male and female appointments. Some examples are positions such as ‘President’, ‘Vice President’, and ‘Chief Operating Officer’, which are more equally balanced in gender in Figure 4 as opposed to 10 years ago. Ideally, continued monitoring would show a similar trend for all positions, striving for a less gender-segregated workforce.

A final interesting element to consider when reviewing the system results in Figure 4, is the gender division of ‘new’ positions. For instance, relatively new positions such as ‘Vice President of Sustainability’ and ‘Chief Sustainability Officer’ do not appear to be appointed to any gender specifically. Mapping the gender division on a continued basis allows for tracking changes in occupational gender segregation within organizations or industries.

## VII. CONCLUSION

With the growing awareness of social and environmental challenges as well as the changing regulatory environment, sustainability reporting has become common practice. This development accelerates the need to develop appropriate monitoring tools with the aim to provide a reasonable level of objective assurance on the claims made in such reports. In this study, we aim to answer the following research question: “How can a counter-account monitoring system for gender equality in the hospitality industry be designed?” To answer the research question, a system has been designed and tested. The purpose of such a system is to review organizations’ gender diversity policies and monitor the progress of their action plan. Our paper offers several theoretical and practical contributions.

The first result of the study consists of the standardization of job titles used in the hospitality industry. In this study, a

large array of job titles have been identified. The study has shown that multiple titles are used to indicate the same job. This array of job titles can be confusing to the public, applicants, and to employers. It is necessary to address this vagueness and the overwhelming amount of job titles. The second result is a pilot system architecture for the counter-accounting system on gender equality. The third result is a categorization of workforce equality topics reported upon in hotel chains’ integrated, annual, or sustainability reports. The topics of the statements found in the reports could be grouped into six different categories. This categorization could form a foundation for a standardized reporting outline for workforce equality in the hotel industry. The fourth and final result of the study is a view of the industry’s gender division in different positions for the past 10 years.

With regards to organizations’ gender equality reporting, it can be seen that within their own documentation, organizations (can) choose their own level of granularity on which to report. Most organizations subject to our analysis choose to report on a low level of granularity, for example, the male/female ratio of executives. This gives them the ability to steer and control communication with external stakeholders. Our research has shown that based on the analysis of counter-accounts, a higher level of granularity with respect to reporting can be achieved, which may in turn change the narrative of a specific hotel chain, positively or negatively. We need to challenge not only hotel chains, but organizations in general, to start reporting on a higher level of granularity and provide a complete narrative. In addition, hotel chains may also choose to include counter-accounts in their reporting to provide context to these counter-accountants.

The research has several limitations, both on the subject matter of hospitality and on the actual counter-account system. First, the current use of the counter-accounting system is limited to challenging workforce equality statements made about man/woman parity. Future research should be devoted to extending the current system so that it can also counter-act statements made on other workforce equality topics, such as Racial Equality, Disability Equality, L.G.B.T.Q.I.A.+ Equality, and Equal Compensation. Another direction for future research is to focus on collecting more and different job titles to improve the current system, which is an integrated part of the application. Lastly, future research could focus on additional sectors to expand the results.

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