Wolfie Christl

MONITORING WORK AND AUTOMATING TASK ALLOCATION IN RETAIL AND HOSPITALITY

A case study on software for worker monitoring and performance control in retail stores, restaurants and hotels

GEFÖRDERT DURCH Digifonds

AK WIEN

A CASE STUDY BY CRACKED LABS

Vienna, June 2023

This publication is part of the project "Surveillance and Digital Control at Work": crackedlabs.org/data-at-work

Monitoring Work and Automating Task Allocation in Retail and Hospitality

A case study on software for worker monitoring and performance control in retail stores, restaurants and hotels. Cracked Labs, June 2023.

Author: Wolfie Christl
Edited by: Mike Holohan

Cracked Labs – Institute for Critical Digital Culture
Gumpendorfer Straße 63b, 1060 Vienna, Austria
https://crackedlabs.org

This publication is part of the project "Surveillance and Digital Control at Work", which aims to explore and examine how companies use personal data on workers in Europe.
https://crackedlabs.org/data-at-work

The production of this publication was supported by the "Digitalisierungsfonds 4.0" of AK Wien.

Contents

Summary

Decades after supermarkets introduced computerized cash registers and barcode scanners, the "point of sale" or POS system now lies at the heart of information technology used in retail stores, restaurants and hotels. Data recorded by the POS system has become a rich source of information about work carried out by cashiers, salespersons, restaurant servers and other service workers. Overall, work in retail and hospitality is increasingly mediated and managed through digital technology, from shelf stocking in stores to food preparation in kitchens to room cleaning in hotels.

This case study explores, examines and documents how software used by retailers, restaurants and hotels processes personal data on employees in order to track behavior, monitor performance, direct work and automate task allocation. First, it gives an overview of software systems in retail and hospitality, specifically addressing functionality for managing and monitoring workers and the subsequent effects this has on them, based on a brief review of field reports, survey-based studies and media articles, with a focus on Europe. Second, the case study investigates retail and hospitality systems offered by the enterprise software vendor Oracle, based on a detailed analysis of software documentation and other corporate sources. Oracle, a major vendor with a significant customer base in Europe, was selected as an illustrative example of wider practices. The examination documents a wide range of mechanisms that help employers to structure, direct, monitor and control work:

- **Performance monitoring and behavioral control.** Retail stores can use rich behavioral data on sales transactions recorded by the POS system to rate and rank **cashiers and salespersons** by their speed of work and sales performance, down to every instance of scanning an item with the barcode scanner. Similarly, **restaurant servers** can be rated and ranked by the number of table turnovers and guests served, average sales per guest, tips received and by how often they have returned late from breaks. Employers can rank workers "from best to worst", identify "underperformers", single out the "least profitable" employees and predict how productive they might be in the future. Assessing workers by their sales performance or even by the tips they receive from guests can be considered a form of quantifying affective work. This kind of monitoring can put workers under pressure. Fraud prevention systems for retail stores use POS data for continuous risk profiling, constantly assessing whether a cashier's behavior may point to "employee fraud", "policy violations" or "training issues" and singling out "high risk" cashiers, who are then put on a "watch list".
- **Automated task allocation and algorithmic management.** One system for retail stores can automate task allocation by assigning pick lists to **shelf stockers**, who move store inventory across the backroom and shelves, while monitoring their every step based on handheld devices with barcode scanners. A housekeeping system for hotels can automate task allocation for **room attendants**, who receive instructions about which room to clean next via a mobile device, including a target time for each room. Workers see a timer that counts the minutes and seconds they have already spent on a room. Cleaning tasks are distributed based on rules, booking data and predefined "credits" that represent the time required to complete different kinds of tasks and other rules. Employers can view reports about the time spent cleaning rooms. Another system subjects **kitchen workers** to rigid micromanagement. In order to "optimize kitchen workflows" and "speed of service", restaurants can determine target times for the preparation of each food item or component. The system then distributes guest orders and assigns them to workers across several kitchen stations, who see their preparation tasks on video monitors. Timers and red-blinking alerts notify employees when the specified preparation time for a

food item has been exceeded and put workers under immediate pressure. A table management system for restaurants can display alerts that remind **servers** to collect the bill or stop by a table once again.

Several systems build on earlier practices, but by expanding the share of work activities that are subject to digital recording and automated direction, they significantly increase the potential for performance and behavior control. When fully implemented, these systems can be used to maximize productivity and keep costs low while leaving little room for agency and discretion at work. The recorded data can also serve as evidence for employee misconduct at a later point in time. When these systems fail to create an exhaustive and realistic digital representation of the work process, this may lead to deviations between actual work and digital records, to arbitrary decisions being made about employees, and to discomfort and stress.

According to Oracle, its technology processes $100 billion in retail transactions annually and is installed in 350,000 restaurants and 40,000 hotels, from small businesses to quick service chains, large resorts, theme parks and even cruise ships. Some of the systems examined in this case study are part of, or can be interlinked with, higher-level systems for store operation, inventory management, property management (PMS), enterprise resource planning (ERP), supply chain management (SCM) and business intelligence (BI). In part, Oracle's performance monitoring systems for retail appear to be based on a standard for data processing defined by a retail industry association.

The findings of this case study will be incorporated in the main report of the ongoing project "Surveillance and Digital Control at Work" (2023-2024) led by Cracked Labs, which aims to explore how companies use personal data on workers in Europe. The main report will draw further conclusions.

1. Introduction, background and overview

This case study explores, examines and documents how software used by retailers, restaurants and hotels processes personal data on employees in order to track behavior, monitor performance, direct work and automate task allocation – with a focus on Europe. To illustrate wider practices, it investigates systems offered by the major enterprise software vendor Oracle that affect cashiers, salespersons, shelf stockers, restaurant servers, kitchen workers and hotel attendants, based on an analysis of corporate sources such as software documentation and marketing materials.

1.1 Monitoring and managing workers in retail and hospitality

This introductory section provides a brief overview of technologies and software systems that process data on workers in retail stores, restaurants and hotels, based on existing literature.

Monitoring and managing retail workers. Several decades ago, when supermarket chains started to introduce computerized cash registers and barcode scanners, Harry Braverman (1974, p. 257) warned that these technologies would turn the checkout counter into an assembly line and allow managers to monitor the speed of work from a "single central station". Data on sales transactions and other activities recorded by the cash register, which is now better known as the "point of sale" (POS) system, has become a rich source of information for retail management (Stone and Hollier, 2000), including for performance monitoring and behavior control (Evans and Kitchin, 2018; Van Oort, 2018). Barcode scanners not only capture data on work carried out by cashiers and salespersons, but have also become a common means of tracking store inventory across backrooms and shelves. They enable the monitoring of any work activity related to the movement of merchandise items, for example, when refilling empty shelves. In addition, shelf stockers' handheld scanners can turn into devices that direct and assign tasks by displaying "pick" lists of items that need to be handled (Wong and McFarlane, 2007). Data on sales transactions recorded by the POS system can directly influence automated task allocation in the inventory management system. Both can be interlinked with higher-level systems such as enterprise resource planning (ERP) and supply chain management (SCM) software, which facilitate coordination and control both within retail organizations and across the supply chain (Evans and Kitchin, 2018; Frances and Garnsey, 1996).

Drawing on ethnographic research in a large Irish retail store, Evans and Kitchin (2018) observed that team leaders regularly assessed cashiers against performance metrics based on POS data, such as the speed of scanning, sales totals and the number of "interventions". Salespersons in the mobile phone department were assessed against metrics on the number of pay-monthly tariffs sold in a week. Pickers for home deliveries ordered through the web were assessed against the pick rate by hour based on data from handheld devices with barcode scanners. Shelf stocking and printing price labels for merchandise items also involved the use of handheld devices. The authors conclude that the management of work in retail stores is increasingly being "automated, mediated, monitored and regulated by code and data that saturates all tasks and sites of labour". Where the new control technologies based on invisible data capture fail, earlier disciplinary practices such as human supervision and video surveillance fill the gaps. They found that performance metrics often did not reflect work tasks related to affective labor, such as assisting customers on request, troubleshooting and handling complaints. Work that was not recorded, and thus not reflected in performance appraisals, specifically included assisting customers at the self-checkout terminals.

According to a survey by the Swedish union Handels, 35% of retail workers stated that individual sales are measured in their stores, with another 32% stating that they do not know whether this is the case or not. 75% of respondents

stated that video surveillance, another traditional technology of control, is present, and 34% stated that their employer uses mystery shoppers to evaluate work in the store (Berggren and Wrangborg, 2022). Madison Van Oort (2018) has examined how digital monitoring in fashion retail forces workers to carry out a specific "emotional work of surveillance". She also points to the role of automated shift scheduling as another technology of control that helps to "discipline a just-in-time workforce". Alex Wood (2020), who investigated retail work across the UK and US, refers to these flexible scheduling practices, which include punishing workers by changing their hours to the worse, as "despotism on demand". Recent monitoring technologies in retail also include the use of video-based analytics to track the movements of both customers and employees in a store (Sánchez-Monedero and Dencik, 2019, p. 22) and the use of heat sensors to track the length of checkout queues (Gilbert and Anna, 2021, p. 12).

Monitoring and managing restaurant workers. Even more than retail, the POS system lies at the heart of information technology used in restaurants, bars and food and beverage services in hotels. As in retail, POS data makes it "much easier" to "quantify" the work performance of servers and waiters, according to an introductory textbook on "Food and Beverage Management" (Davis et al., 2018, p. 52). Restaurant POS systems provide employee metrics such as customers served per hour, revenue generated, tips earned and the time it took to service tables. This information can be used to determine "whether a member of staff needs more training, needs to be praised for brilliant work or needs to be evaluated, as they do not seem to match the required standards". The "ease of obtaining such information" would allow for "the information to be shared around with the team" (ibid).

Restaurant POS software can run on both stationary and mobile devices and has evolved into comprehensive software that can be used to manage almost every aspect of work in both smaller and larger restaurants, both in table service and quick service restaurants, as a standalone system or in combination with additional software modules. In addition to guest orders and billing, functionality can include table reservations, online ordering, inventory management, accounting, payroll, employee scheduling, time and attendance tracking and even video surveillance. Table management functionality can keep track of the time customers have been seated at a table. Guest orders captured in the POS system can be automatically sent to the kitchen, either via printed tickets or via video monitors. These video monitors, which are also referred to as "kitchen display systems", can turn into automated task allocation systems for kitchen workers that include timers and performance monitoring (Pantelidis, 2009; Marvil, 2015).

As far back as 1998,[1] McDonalds introduced a POS system that sends orders as individual tasks to kitchen monitors, which display the time since an order was made.[2] Internal manuals show the use of rigid time targets such as 11 seconds for bun toasting, 20 seconds for "assembly", 14 seconds for "wrapping" and 45 seconds for taking an order, handling the payment and handing out the meal.[3] While not every small restaurant, cafe or bar will fully implement these technologies, today's POS and kitchen management systems[4] are easily available, cheap[5] and also sold by

[1] Kirk, Jim (1998): McDonald's pitches its 'made for you' plans. Chicago Tribune, 18.3.1998. Online: https://www.chicagotribune.com/news/ct-xpm-1998-03-18-9803180305-story.html

[2] McDonalds (unknown year): Information System used In McDonalds. Online: https://www.academia.edu/43373269/Information_System_used_In_McDonalds [29.3.2023]

[3] McDonalds (2014): McDonald's New Employee Manual. Online: http://s3.amazonaws.com/scschoolfiles/497/mcdonalds_employee_handbook.pdf [https://perma.cc/LTQ2-R6MZ] [29.3.2023]

[4] See e.g. https://www.capterra.com/restaurant-pos-software/

[5] Square from $20/month: https://squareup.com/us/en/point-of-sale/restaurants/kitchen-display-system, Oracle from $55/month: https://www.oracle.com/industries/food-beverage/restaurant-pos-systems/simphony-pos/, TouchBistro from $69/month: https://www.touchbistro.com/pricing/

European vendors.[6] Other technologies for restaurants include the use of guest ratings of customer service to measure "customer satisfaction" and rate the performance of workers (Mateescu and Nguyen, 2019).

Monitoring and managing hotel workers. Hotels use software that is similar to what restaurants use for their food and beverage operations, above all a POS system. In addition, the "property management system" (PMS) covers many other duties involved in running a hotel, resort or other accommodation establishment, including front and back office, sales, reservations, billing, accounting, room management and service, housekeeping, maintenance and security (Kokaz et al., 2011; Kansakar et al., 2019). Hotel software contains functionality to manage the work of servers, kitchen workers, sales associates, front desk staff, service clerks, maintenance workers and room attendants (see section 3). Housekeeping staff may, for example, carry mobile devices that continually tell them which room to clean next, while also tracking their work speed.

While these technologies promise to increase speed and efficiency by optimizing the order in which rooms are cleaned, they can also have adverse effects on workers (Mateescu and Nguyen, 2019). When Marriot introduced automated task allocation for room attendants a few years ago, this led to more intense work, less work discretion, a disregard of on-the-ground experience and workers having to absorb complaints from guests who wondered why their room was skipped even though they saw housekeepers cleaning rooms on the floor all day, according to a media report (Reyes, 2018).

1.2 Oracle software for retail and hospitality

This case study documents technologies and data practices based on the examination of software that is available on the market and sold to employers. Building on previous German-language research (Christl, 2021) and a literature review, it focuses on software provided by Oracle, which was selected as an illustrative example of wider practices for two reasons. First, Oracle is among the world's largest enterprise software vendors[7] and is considered a major player in POS systems and information technology for retail businesses, restaurants and hotels[8] with a significant customer base in Europe,[9] not least because of its 2014 acquisition of Micros, a hospitality technology vendor.[10] Second, Oracle provides several thousands of pages of software documentation[11] online.

1.3 Overview of the case study

This case study examines how Oracle software used by retailers, restaurants and hotels processes personal data on employees in order to track behavior, monitor performance, direct work and automate task allocation, based on an

[6] E.g. S4D (Netherlands): https://s4d.eu/solution/kitchen-display-system-kds/, Black Pepper (Austria): https://www.black-pepper.at/

[7] See e.g. https://en.wikipedia.org/wiki/List_of_the_largest_software_companies, https://www.investopedia.com/articles/personal-finance/121714/worlds-top-10-software-companies.asp

[8] See e.g. Forrester (2018): The Forrester Wave: Point Of Service, Q3 2018. https://www.forrester.com/report/The-Forrester-Wave-Point-Of-Service-Q3-2018/RES140771; IDC (2022): IDC MarketScape: Worldwide Hospitality Property Management Systems 2022 Vendor Assessment. https://www.idc.com/getdoc.jsp?containerId=US48098122; Grand View Research: Point-of-Sale Software Market. https://www.grandviewresearch.com/industry-analysis/point-of-sale-pos-software-market; Eternity Insights (2020): Kitchen Display System Market. https://www.eternityinsights.com/report/kitchen-display-system-market

[9] See sections X and X

[10] https://investor.oracle.com/investor-news/news-details/2014/Oracle-Completes-Acquisition-of-MICROS-Systems/default.aspx [28.3.2023]

[11] https://docs.oracle.com/en/industries/retail, https://docs.oracle.com/en/industries/food-beverage/, https://docs.oracle.com/en/industries [28.3.2023]

analysis of publicly available information provided by Oracle such as software documentation[12], training videos[13] and marketing materials.[14]

Section 2 focuses on Oracle software for the retail industry:

- It shows how employers can use extensive data on sales activities recorded by the POS system to rate and rank cashiers and salespersons by their speed of work and sales performance. Managers can use a wide range of reports for performance and behavior control to, among other things, single out the "least profitable" employees (section 2.1).
- Oracle also provides analysis technologies that use sensitive employee attributes such as gender, age, disability and language to predict how productive and profitable workers might be in the future (section 2.2).
- Software for "loss prevention" that aims to detect employee fraud uses POS data for continuous risk profiling. It constantly rates the entire staff according to whether their behavior may point to fraud, "policy violations" or "training issues" and singles out "high risk" cashiers, who can then be put on a "watch list" (section 2.3).
- Oracle's retail software offers a wide range of features to operate stores, including time and attendance management, shift scheduling and demand forecasting, as well as task management for different kinds of activities ranging from setting up display windows to cleaning restrooms. Specifically, it contains an automated task allocation system that manages how store inventory moves across the backroom and shelves by assigning pick lists to shelf stockers and monitoring their every step, based on handheld devices with barcode scanners (section 2.4).

Section 3 focuses on Oracle software for restaurants and hotels:

- It shows how employers can use extensive data carried out by restaurant servers, kitchen workers and hotel room attendants for performance and behavior control. Based on POS data, managers can rate and rank servers "from best to worst" by their speed of work, sales performance, the tips they receive and how often they have returned late from breaks. Oracle suggests using the reports to provide "competition opportunities", "reward performance" and "identify underperformers". Reports on "employee exceptions" promise to detect "suspicious behavior" such as fraud. Rating servers by the tips they receive from guests can be considered a form of assessment that measures "customer satisfaction", and thus quantifies affective work (section 3.1).
- Oracle's table management system expands the degree of digital mediation in service work by showing table timers and service alerts to servers (section 3.2).
- Its kitchen management software subjects workers to rigid micromanagement by fully automating task allocation and performance control. In order to "optimize kitchen workflows" and "speed of service", restaurants can determine target times for the preparation of each food item or component. The system then prioritizes and distributes guest orders and assigns them as tasks to workers across several kitchen stations, who can see the queue of their preparation tasks on video monitors. Timers and red-blinking alerts, which notify employees when the specified preparation time for an item has been exceeded, put workers under immediate pressure. Managers can view "kitchen performance" reports on preparation times and the number of alerts (section 3.3).
- Similarly, Oracle's housekeeping system for hotels can automate task allocation for room attendants, who

[12] Ibid.
[13] https://www.youtube.com/@OracleLearning/videos [28.3.2023]
[14] E.g. https://www.oracle.com/industries/retail/, https://www.oracle.com/industries/food-beverage/, https://www.oracle.com/industries/hospitality/ [28.3.2023]

receive instructions about which room to clean next via a mobile device, including a target time for each room. Workers see a timer that counts the minutes and seconds they have already spent on a room. Cleaning tasks are distributed based on rules, data from the booking system and predefined "credits" that represent the time required to complete different kinds of tasks. Managers can view real-time reports about task completion and the time spent cleaning rooms. Oracle's hotel management systems also include mechanisms to manage tasks for other hotel workers, from guest complaints to maintenance (section 3.4).

Both section 2 and 3 contain concluding remarks that reflect on the findings.

1.4 Context, scope and limitations

This case study is part of a series of case studies on systems that process data at the workplace, which are, in turn, part of the **ongoing project**, "Surveillance and Digital Control at Work",[15] led by Cracked Labs. The project aims to explore how companies use personal data on and against workers in Europe, together with AlgorithmWatch, Jeremias Prassl (Oxford), UNI Europa and GPA, funded by the Austrian Arbeiterkammer. The case studies build on **previous research** on the topic (Christl, 2021). They aim to document technologies and data practices by reviewing existing literature and by **examining technologies and software systems** that are available on the market based on publicly accessible vendor information. This includes software documentation and marketing materials, which might be ambiguous and incomplete. Every effort has been made to accurately interpret these corporate sources, but we cannot accept any liability in the case of eventual errors. Where the case studies rely on the examination of corporate sources, it remains largely unclear how employers actually implement, customize and use the functionality provided by these systems. The findings of the case studies will be incorporated into the **main report** of the ongoing project, which will draw further conclusions from the findings.

This case study on the use of data on retail and hospitality workers focuses on software that enables performance monitoring, fraud prevention and automated task allocation. It does not address **other relevant data practices in retail and hospitality**, such as shift scheduling, video surveillance, video-based tracking, and the use of customer ratings for performance assessment. It does not address performance control mechanisms such as performance-based pay and sales commissions and generally only lightly touches on how employers can use monitoring to make decisions about workers. These technologies and practices are to be addressed in the project's other case studies and reports in the project. Sections 2.1 and 2.2 in this case study are based on the analysis of software documentation from the year 2013. While newer versions are available, their documentation is not publicly accessible. These sections still provide relevant insights into retail data practices from the past decade.

[15] https://crackedlabs.org/en/data-at-work

2. Performance monitoring, fraud prevention and automated task allocation in retail

The major enterprise software vendor Oracle provides a wide range of products and cloud-based services,[16] which help retailers such as grocery stores, mass merchants, fashion retailers, department stores and specialty stores to manage and monitor salespersons, cashiers and other retail workers.

Oracle states that its retail software processes $100 billion in transactions annually in 96 countries.[17] According to its website, customers include large US retailers such as Staples and Best Buy, global players such as Levi Strauss and Adidas, and several European companies such as Prada (Italy), Galeries Lafayette (France), John Lewis and Partners (UK), CCC Group (Poland), Samsonite Europe and Estée Lauder Europe.[18] Partners who help customers to implement and customize Oracle's retail solutions include the Italian consulting firm Reply.[19]

2.1 Rating and ranking cashiers and salespersons

Under the product name "Retail Data Model", Oracle offers a "data warehouse and business intelligence platform" intended to help retailers analyze a broad spectrum of data from the different systems they use to operate their businesses.[20] The platform promises to calculate "1,800 industry measures and KPIs" based on information stored in 1,250 database tables with 18,500 attributes.[21] Each "retail transaction" and many other database records are linked to particular employees and thus provide information about their work.[22] Retailers can use a large number of predefined reports to gain insights into financials, product supply, inventory, store operations, customers, marketing and sales. Several of the reports contain information about named employees and their work performance.[23]

As shown in figure 1 (left), the **cashier ranking** report displays a list of workers ranked by sales activities handled over a period of time. The best-ranking cashier in this example report processed 4,956 sales transactions in a year, selling an average of 1.86 items per sale, which amounted to total sales of 13,397. According to Oracle's documentation, the report "is used to identify the most or least productive cashiers". Similarly, the **salesperson performance** report (figure 1, right), which "is used to identify the most or least productive salesperson", shows a list of workers and their corresponding performance metrics, such as the sales amount, the average number of transactions per day and the average number of items sold per transaction.[24]

[16] https://www.oracle.com/industries/retail/products/, https://docs.oracle.com/en/industries/retail/ [14.3.2023]
[17] https://www.oracle.com/industries/retail/ [14.3.2023]
[18] https://blogs.oracle.com/retail/post/staples-customer-experience-retail-technology, https://blogs.oracle.com/retail/post/best-buy-forecasting-oracle-cloud, https://blogs.oracle.com/retail/post/levi-strauss-mobile-pos, https://www.oracle.com/us/industries/retail/retail-xbri-loss-prevention-cs-info-4892051.pdf, https://www.oracle.com/corporate/pressrelease/prada-group-oracle-cloud-040219.html, https://blogs.oracle.com/retail/post/galeries-lafayette-group-oracle-retail-merchandising-store-inventory-operations, https://blogs.oracle.com/retail/post/global-footwear-retailer-ccc-group-taps-oracle-to-boost-profitability, https://blogs.oracle.com/retail/post/samsonite-europe-extends-alliance-and-upgrades-with-oracle-retail, https://blogs.oracle.com/retail/post/estee-lauder-retail-technology-customer-experience [14.3.2023]
[19] https://partner-finder.oracle.com/catalog/Partner/SCPP-NXLRKPIA, https://www.reply.com/retail-reply/en/ [14.3.2023]
[20] https://www.oracle.com/database/technologies/retail-data-model.html, https://docs.oracle.com/cd/E35214_01/doc.1131/e20361/intro_rdm.htm, https://docs.oracle.com/cd/E35214_01/doc.1131/e20363/pdm.htm [10.3.2023]
[21] https://docs.oracle.com/cd/E35214_01/doc.1131/e20363/impintro.htm [10.3.2023]
[22] https://docs.oracle.com/cd/E35214_01/doc.1131/e20361/logical_rdm.htm [10.3.2023]
[23] https://docs.oracle.com/cd/E35214_01/doc.1131/e20361/sample_report2_rdm.htm [10.3.2023]
[24] Ibid.

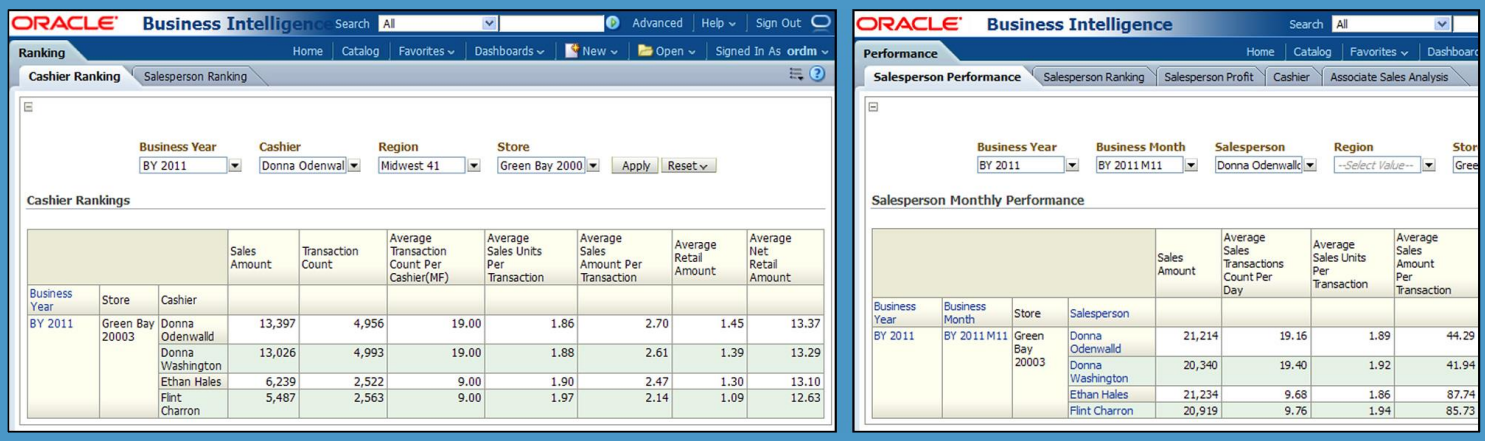

Figure 1: Oracle "cashier ranking" and "salesperson performance" reports[25]

The "salesperson profit" report, which is "used to identify the most or least profitable salesperson", according to Oracle, ranks workers **by the profit** the retailer made on the sales transactions they handled. Other reports show metrics about **customer returns** per employee, as well as **group-level metrics** and rankings, for example on transactions, sales and profit per store or department.[26]

Oracle's retail data system contains even more detailed behavioral data on sales activities. For example, it analyzes information about every single instance when transaction data is entered, such as scanning a line item with a **barcode scanner**.[27] As shown in figure 2 (left), the "entry method" report gives a breakdown of the number of line items handled by an employee for each type of entry method such as the keyboard, barcode scanner, magnetic stripe reader or smart card.

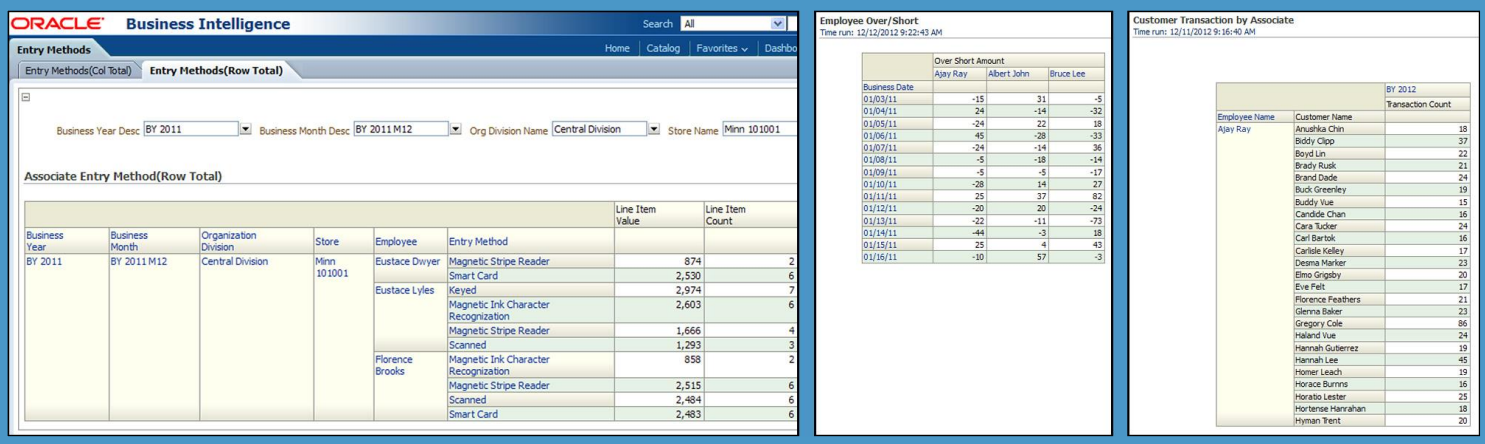

Figure 2: Oracle retail reports on behaviors, over/short amounts and customer interactions[28]

[25] Figures © Oracle. The figures serve as basis for the discussion of the corporate practices examined in this study. Source: Oracle Retail Data Model Documentation, Release 11.3.2, Sample Reports, https://docs.oracle.com/cd/E35214_01/doc.1131/e20361/sample_report2_rdm.htm [9.3.2023]

[26] Ibid.

[27] https://docs.oracle.com/cd/E35214_01/doc.1131/e20361/logical_rdm.htm [10.3.2023]

[28] Figures © Oracle. The figures serve as basis for the discussion of the corporate practices examined in this study. Source: Oracle Retail Data Model Documentation, Release 11.3.2, Sample Reports, https://docs.oracle.com/cd/E35214_01/doc.1131/e20361/sample_report2_rdm.htm [9.3.2023]

Another report addresses whether there is **cash missing** in a worker's cash drawer. It lists discrepancies between transaction receipts and the physical count of cash per employee and day, and thus identifies workers who had less or more cash than expected in the cash drawer on a particular day (figure 2, center).[29]

As figure 2 (right) indicates, the "customer transaction by associate" report shows the number of sales that a specific named worker had with a list of **named customers**. The report is part of the "loss prevention" section and is intended to help identify "exceptional numbers of transactions between an associate and customer", according to the documentation.[30] It is questionable whether access to a full list of named customers of named employees is really necessary for this purpose. Many other reports also deal with customer data. For example, the "defection profitability" report shows a list of customers, including their names, email addresses and "profitability segment" scores, which indicates extensive customer profiling.[31]

Oracle's "Retail Data Model". Generally, the reports in Oracle's "Retail Data Model" platform enable far-reaching employee monitoring and performance control, even if they display employee IDs rather than employee names, which is the case in some of the reports. The company refers to the reports as "predefined reports" or "sample reports", which are delivered with the product and "illustrate" its "analytic capabilities".[32] Both the data model and the reports are customizable, and Oracle emphasizes that the platform usually "requires some customization" to meet a retailer's business needs.[33] The "Retail Data Model" is "based on the ARTS 6.0 standard",[34] which is a "retail enterprise information architecture model capable of supporting world-wide operations" maintained by the Association for Retail Technology Standards (ARTS),[35] a division of the US National Retail Federation.[36] The ARTS standard is, among other things, "intended to be a complete detailed record of *everything* that happens within a point of sale environment over the course of day to day operations" (emphasis in original).[37]

The analysis of Oracle's "Retail Data Model" in this section and in section 2.2 is based on publicly accessible documentation of a version of the system from the year 2013.[38] The documentation for newer versions (up to a version labeled with the year 2023) is not publicly accessible.[39]

2.2 Predicting worker and group performance based on sensitive data

In addition to the reports described in the previous section that use basic calculations and inferences, Oracle's "Retail Data Model" platform also offers "data mining packages" that use machine learning models to predict work performance and other metrics based on extensive worker data, and then display the profiling results in reports.[40]

[29] https://docs.oracle.com/cd/E35214_01/doc.1131/e20361/sample_report2_rdm.htm [10.3.2023]
[30] https://docs.oracle.com/cd/E35214_01/doc.1131/e20361/sample_report2_rdm.htm [10.3.2023]
[31] Ibid.
[32] https://docs.oracle.com/cd/E35214_01/doc.1131/e20363/rep_quer.htm [10.3.2023]
[33] https://docs.oracle.com/cd/E35214_01/doc.1131/e20363/impintro.htm [10.3.2023]
[34] Ibid.
[35] https://www.omg.org/retail-depository/arts-odm-73/ [10.3.2023]
[36] https://www.consortiuminfo.org/list/association-for-retail-technology-standards-arts/ [10.3.2023]
[37] https://www.omg.org/retail-depository/arts-odm-73/arts_transaction_concepts.htm [10.3.2023]
[38] https://docs.oracle.com/cd/E35214_01/doc.1131/e20364/toc.htm [10.3.2023]
[39] https://docs.oracle.com/en/industries/retail/index.html, https://support.oracle.com/knowledge/Oracle%20Cloud/2910995_1.html [10.3.2023]
[40] https://docs.oracle.com/cd/E35214_01/doc.1131/e20361/data_mining_rdm.htm [14.3.2023]

Predicting worker performance. The "Employee Sales Analysis" and "Employee Basket Analysis" models predict performance metrics such as the "sales amount", the "profit amount" and the "average basket size" for employees, as Table 1 shows.[41] They calculate an estimate of how much an employee may sell and how profitable they might be in the future, based on employee data that is unrelated to sales activities. Source attributes include not only the number of months on the job, total hours worked, overtime hours and income, but also employee attributes that are clearly sensitive, such as gender, age, disability, nationality, correspondence language and marital status.

Source attributes	Predicted attributes
Employee Id, Designation Name, Designation Title, Designation Level, Nationality, Gender, Marital Status, Age, Net Income, Demographics Code, Title, Total Months of Job, Employee Type, Correspondence Language, Disability Indicator, Rehire Recommendation Indicator, HR Based Salary Eligibility Indicator, Overtime Hours Salary Eligibility Indicator, Commission Eligibility Indicator, Spiff Allowed Flag, Total Hours Worked, Total Overtime Hours, Month Code, Case Id Alt (PK)	Sales Amount, Cost Amount, Profit Amount, Average Basket Size, Average Basket Value, Total Basket Count

Table 1: Oracle "Employee Sales Analysis" and "Employee Basket Analysis" models

The system trains different machine learning models using employee attributes taken from the "Retail Data Model" database tables. On the one hand, it "identifies which key attributes of an employee influence" performance metrics by discovering statistical correlations between source and target attributes. On the other hand, it predicts the target attributes based on the source attributes, for example, for new employees. As such, it promises to predict the performance of new employees using a model trained on data about existing employees. For example, it could predict that a particular employee might sell merchandise items for € 3,500 in the future. The documentation includes more details about these predictions, including on the DT/SVM models they use.[42]

Predicting group performance. The "Employee Combination Analysis", another model described in the documentation, promises to identify groups of employees who are "likely to perform better at a store on a shift" than other groups. To train the model, it is fed with data on groups of employees who have been working at a store or in a shift. Input data includes average and numerical data on the group's sales amount, basket size, income, age, gender, disability status, marital status, household size, education and the distance between their home and the store. The analysis then produces information about statistical correlations between group attributes and sales performance. The trained model can then be "applied" to different groups of employees to predict their store or shift performance. Oracle suggests using this analysis for "future employee allocation". Put differently, the model uses sensitive data on age, gender, disability status and on whether workers are "single", "married" or "divorced" to make decisions about who will work in which store or shift.[43]

The analysis of this system is based on documentation from the year 2013 (see previous section). Newer software versions may or may not have made changes.

2.3 Risk profiling for fraud prevention based on POS data, purpose creep

In addition to performance monitoring, Oracle also offers software that promises to detect and prevent employee fraud based on analyzing POS data. Its "XBRi loss prevention" system continuously tracks the behavior of cashiers

[41] Ibid.
[42] Ibid.
[43] Ibid.

to identify "suspicious" transactions, "exceptions" and "data anomalies" that point to "employee fraud", "policy violations" and "training issues",[44] for example regarding refunds, discounts and voids.[45] It uses "behavioral analysis" and "machine learning" to "detect anomalies on known and unknown patterns".[46] Supervisors can add cashiers they "want to monitor" to a "watch list", access information on "previous watch list activity",[47] extract details "within seconds" and use "forensic analysis" to further investigate suspicious workers. Oracle refers to the system as "the world's most widely used loss prevention and store data analysis tool"[48] and names Adidas as a customer.[49]

Figure 3 (left) shows a dashboard that displays a ranked list of suspicious cashiers, including their names, previous "exceptions" and information about their "watch status". In this example, two workers are labeled "high risk", and two other workers are labeled "interview scheduled". One "exception note" states that a manager has "researched the cashier" and will "continue to monitor" them.

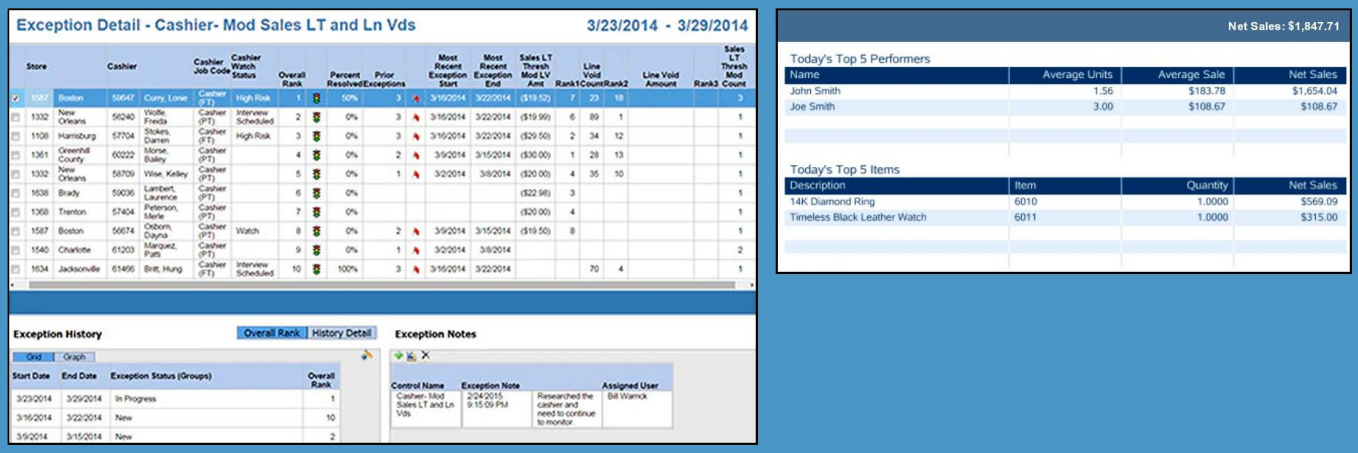

Figure 3: Oracle retail software for fraud prevention and performance monitoring[50]

In addition to singling out suspicious workers based on a continuous risk profiling of all workers, supervisors can access previously recorded **video surveillance** footage that corresponds to a particular sales transaction.[51]

Risk profiling and performance monitoring. Oracle offers an extra "Sales & Productivity" module that can be added to the "XBRi" product, which is originally a system for loss prevention and fraud detection.[52] As such, the

[44] https://www.oracle.com/a/ocom/docs/industries/retail/oracle-xbri-cloud-service-ds.pdf [11.3.2023]
[45] https://blogs.oracle.com/retail/post/four-new-applications-for-loss-prevention-data-and-exception-based-reporting [9.7.2021]; see also: https://www.linkedin.com/pulse/four-new-applications-loss-prevention-data-reporting-marco-lam [11.3.2023]
[46] https://www.oracle.com/a/ocom/docs/industries/retail/oracle-xbri-cloud-service-ds.pdf [11.3.2023]
[47] https://docs.oracle.com/cd/E71330_01/xbri/pdf/181/WebUser/WebHelp/Lang_1033/Adding_Stores_and_Cashiers_to_Watch_Lists.htm [11.3.2023]
[48] https://www.oracle.com/a/ocom/docs/industries/retail/oracle-xbri-cloud-service-ds.pdf [11.3.2023]
[49] https://www.oracle.com/us/industries/retail/retail-xbri-loss-prevention-cs-info-4892051.pdf [11.3.2023]
[50] Figures © Oracle. The figures serve as basis for the discussion of the corporate practices examined in this study. Sources: Oracle Retail XBRi Loss Prevention Cloud Service, https://www.oracle.com/industries/retail/products/xbri-cloud-service/ [29.7.2021], https://web.archive.org/web/20210703025335/https://www.oracle.com/industries/retail/products/xbri-cloud-service/ [11.3.2023], https://www.oracle.com/us/industries/retail/im08t0-flat-xbri2-2500423.jpg [11.3.2023]; Oracle® Retail Xstore Point of Service Manager's Guide Release 18.0, https://docs.oracle.com/cd/E62106_01/xpos/pdf/180/html/managers_guide/mis_functions.htm [11.3.2023]
[51] https://docs.oracle.com/cd/E71330_01/xbri/pdf/181/xbrics-181-ag.pdf [11.3.2023]
[52] https://docs.oracle.com/cd/E71330_01/xbri/index.html [11.3.2023]

system uses data originally processed for one purpose for an entirely different purpose ("purpose creep"[53]). It uses data that has been processed for fraud prevention to report on employee performance by measuring "sales against hours worked", the "quality and focus of what they sell" and other productivity metrics.[54] Oracle documentation from 2019 suggests that the report shown in figure 3 (right), which displays a ranking of the "top 5 performers", is part of the "XBRi Sales & Productivity" module.[55] As of 2023, Oracle is still selling its XBRi products.[56] The 2019 version introduced an option to "mask" the names of workers in the reports.[57] Oracle's "Retail Data Model" described in the previous sections also provides functionality for both fraud prevention and performance monitoring.[58]

2.4 Store operation and automated task allocation for shelf stockers

Oracle offers dozens of products that help retailers to operate stores.[59] Many of them include functionality that determines which tasks employees should work on at which point in time, and they record detailed information about this. Cash registers have evolved into sophisticated "point of sale" or "point of service" (POS) software systems that serve as key interfaces for managing stores, and can run on both full-size POS workstations and on mobile devices such as tablets and handheld scanners.[60] Oracle also provides a range of POS hardware devices.[61] Its software can be used to assign, direct and monitor different types of work in different types of stores.[62]

Task management. In addition to sales activities by cashiers and salespersons, Oracle's software for POS and store operations provides functionality to manage other tasks. Figure 4 (top left) shows a report on a list of tasks assigned to employees or groups of employees, such as receiving deliveries from a warehouse, counting items on shelves or cleaning restrooms. Tasks may also include setting up a display window, back office work or appointments with customers. Each task contains instructions, information about who it is assigned to, its priority, information about the start and end time, as well as status information such as 'open', 'in progress', 'completed' and 'canceled'. Both managers and employees can add notes.[63] As such, the recorded data is a comprehensive digital representation of work activities carried out by employees. Stores that offer repair or alteration services (e.g. bicycle shops, jewelry stores or clothing retailers) can use so-called "work order" tasks that cover entire workflows, from taking orders and estimating costs to handling customer pick-up.[64]

Automating task allocation for shelf stockers. Oracle's retail software provides a number of mechanisms to manage how merchandise items are received at a store's delivery bay, moved from the back room to the shelves, arranged on shelves, moved across shelves, counted, returned to the back room or shipped to another store.[65] As figure

[53] See e.g.: Bert-Jaap Koops (2021): The concept of function creep. Law, Innovation and Technology, 13:1, 29-56, DOI: 10.1080/17579961.2021.1898299
[54] https://docs.oracle.com/cd/E71330_01/xbri/pdf/181/xbrics-181-ag.pdf [11.3.2023]
[55] https://docs.oracle.com/cd/E62106_01/xpos/pdf/180/xstoresuite-180-rn.pdf, https://docs.oracle.com/cd/E62106_01/xpos/pdf/180/html/managers_guide/mis_functions.htm [11.3.2023]
[56] https://www.oracle.com/content/published/api/v1.1/assets/CONTD676CDB123A7430CAF502B21720B7A03/native/Oracle%20Retail%20Cloud%20Services%20-%20Service%20Descriptions%20and%20Metrics.pdf?cb=_cache_ee77&channelToken=117bec9b3b4e4e90a1c4c9069d210baf&download=false [11.3.2023]
[57] https://docs.oracle.com/cd/E71330_01/xbri/pdf/1601/xbrics-1601-rn.pdf [11.3.2023]
[58] https://docs.oracle.com/cd/E35214_01/doc.1131/e20361/sample_report2_rdm.htm [11.3.2023]
[59] https://www.oracle.com/industries/retail/products/, https://docs.oracle.com/en/industries/retail/ [14.3.2023]
[60] https://docs.oracle.com/en/industries/retail/retail-xstore-point-of-service/22.0/rpxmo/introduction-oracle-retail-xstore-pos.htm [14.3.2023]
[61] https://www.oracle.com/industries/retail/pos-systems/hardware/ [14.3.2023]
[62] https://docs.oracle.com/en/industries/retail/retail-xstore-point-of-service/22.0/rpxmo/introduction-oracle-retail-xstore-pos.htm [14.3.2023]
[63] https://docs.oracle.com/en/industries/retail/retail-xstore-point-of-service/22.0/rpxmo/task-management.htm [14.3.2023]
[64] https://docs.oracle.com/en/industries/retail/retail-xstore-point-of-service/22.0/rpxug/work-orders.htm [14.3.2023]
[65] https://docs.oracle.com/en/industries/retail/retail-xstore-point-of-service/22.0/rpxmo/inventory-replenishment.htm, https://docs.oracle.com/en/industries/retail/store-inventory-op-cloud/23.1.101.0/rsoug/introduction.htm [14.3.2023]

4 (right) shows, employees can receive detailed instructions about which items they should move to another place ("shelf adjustment") or which items they should "pick" from the back room ("shelf replenishment") via their handheld device.

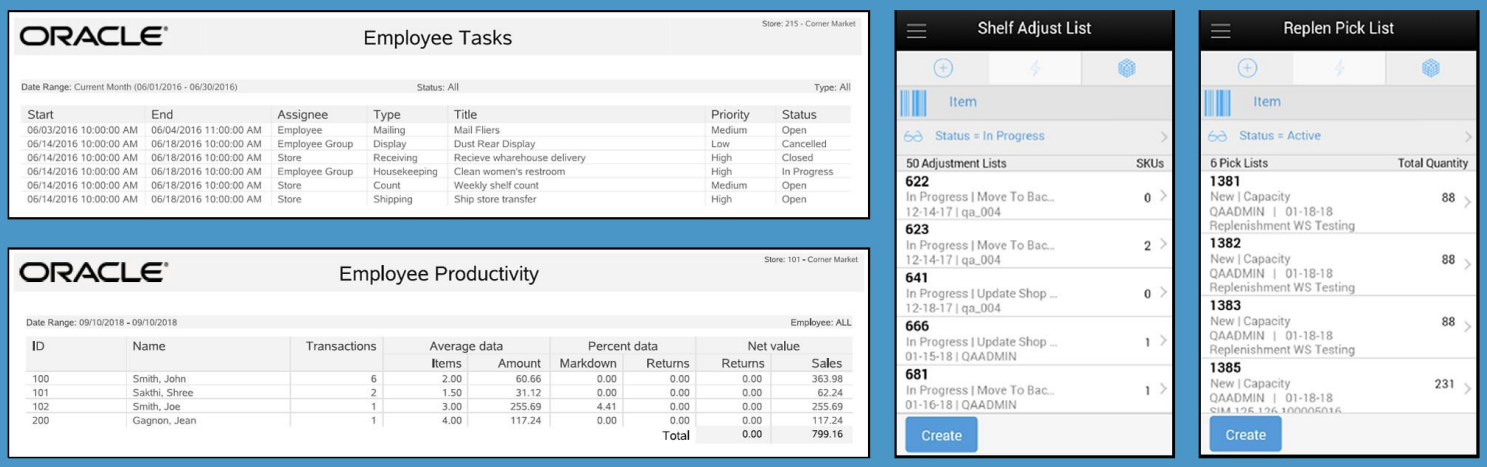

Figure 4: Oracle retail software for productivity monitoring, task management and shelf replenishment[66]

To make both the movement of merchandise items in the store and the performance of inventory operation tasks traceable, shelf stockers constantly use a barcode scanner. Oracle's "location based inventory" functionality promises to track every item "from the time it enters the store until the time it leaves" by recording each item's movement via barcode scanner and other methods that generate metadata on the movement.[67] Items can also be located via radio-frequency identification (RFID) tags,[68] which use electromagnetic waves to track their position.[69] To determine which items should be moved to which place at which time, for example, because the shelf is empty, the system provides different workflows with different degrees of automation. A simple workflow involves one employee scanning barcodes on empty shelves, which generates a "replenishment pick list", which must then be handled by the same or another employee. Workflows with a higher level of automation use algorithms to generate "on demand" pick lists based on real-time data on sales and capacity.[70] In both cases, work instructions are mediated by software, and information about the tasks carried out are recorded.

Store operation, shift scheduling and reporting. Oracle's POS and store operation software covers many other workflows such as manual inventory counts, shelf label printing, cash drawer handling and procedures such as opening and closing a store. Managers can send messages to employees.[71] It provides features for biometric authentication via employee fingerprints for time and attendance tracking such as clocking in and clocking out, including

[66] Figures © Oracle. The figures serve as basis for the discussion of the corporate practices examined in this study. Sources: Oracle Retail XStore Point of Service, Release 22.0, Reports Guide, https://docs.oracle.com/en/industries/retail/retail-xstore-point-of-service/22.0/rpsug/sales-analysis-reports.htm [10.3.2023], https://docs.oracle.com/en/industries/retail/retail-xstore-point-of-service/22.0/rpsug/labor-management-reports.htm [10.3.2023]; Oracle Retail Store Inventory Operations Cloud Services, Release 23.1.101.0, User Guide, https://docs.oracle.com/en/industries/retail/store-inventory-op-cloud/23.1.101.0/rsoug/store-replenishment.htm [10.3.2023]

[67] https://docs.oracle.com/en/industries/retail/retail-xstore-point-of-service/22.0/rpxmo/location-based-inventory.htm [14.3.2023]

[68] https://docs.oracle.com/en/industries/retail/store-inventory-op-cloud/23.1.101.0/rsoug/lookups.htm [14.3.2023]

[69] For RFID technology see Wong and Duncan (2007), or: https://en.wikipedia.org/wiki/Radio-frequency_identification

[70] https://docs.oracle.com/en/industries/retail/store-inventory-op-cloud/23.1.101.0/rsoug/store-replenishment.htm [14.3.2023]

[71] https://docs.oracle.com/en/industries/retail/retail-xstore-point-of-service/22.0/rpxmo/ [14.3.2023]

for breaks.[72] The software also includes "workforce management" functionality, from shift scheduling[73] to "borrowing" employees from other stores,[74] as well as typical HR and payroll functionality such as maintaining employee records and accessing information about pay, sick days and employee reviews.[75] Not least, it includes reporting and analytics functionality.[76] Managers can access, for example, reports on sales, inventory movement, tasks, pick lists, schedules and "employee productivity", the latter of which is shown in figure 4 (bottom left).

The point-of-service system offered by Oracle covers almost every aspect of operating a store. Other products provide advanced functionality for demand forecasting, assortment planning, inventory optimization, consumer insights, fraud prevention (see section 2.3), data integration and analytics (see sections 2.1 and 2.2). They can be linked to other systems, including for human resource management (HRM), supply chain management (SCM) and enterprise resource planning (ERP).[77] Oracle suggests that retailers should use "data and AI to optimize all aspects of staffing". One promotional graphic states they should combine and use employee data on performance, training, customer surveys, store compliance, payroll, time, labor and leave management to gain "workforce insights".[78]

2.5 Concluding remarks

The systems described in the previous sections use extensive data on work activities carried out by **cashiers and salespersons** for extensive performance and behavior monitoring. Workers are assessed, rated and ranked based on rich behavioral data on sales transactions, down to every instance of scanning an item with the barcode scanner. Managers can view reports and rankings that contain a wide range of metrics on both individual employees and groups. While Oracle's reporting software for the retail industry does not directly provide functionality to make decisions about workers based on the data, the company suggests using the reports to identify the "least productive" and the "least profitable" workers. Ranking cashiers by the number of sales can be considered ranking them by purely quantitative criteria such as their speed of work and commitment. Ranking salespersons by the amount of sales or the average number of items per sale can be considered ranking them by qualitative criteria such as their ability to persuade guests, which involves affective work like their performance of friendliness. This kind of monitoring can put workers under pressure. The calculated metrics raise the question of whether they really measure what they claim to measure. They may also reflect circumstances that are beyond the employees' control (see Evans and Kitchin, 2018).

Oracle's system to detect employee fraud also uses POS data for **risk profiling**, which aims to discover suspicious behavior. It constantly ranks all cashiers according to whether their behavior may point to "employee fraud", "policy violations" or "training issues". Cashiers who are assessed as "high risk" can be put on a "watch list". As Madison Van Oort (2020) observed, this kind of constant risk profiling can put workers under stress. An additional software module turns Oracle's fraud prevention solution into a performance monitoring system and thus uses data originally processed for one purpose for an entirely different purpose.

[72] https://docs.oracle.com/en/industries/retail/retail-xstore-point-of-service/22.0/rpxug/miscellaneous-transactions.htm [14.3.2023]
[73] https://docs.oracle.com/en/industries/retail/retail-xstore-point-of-service/22.0/rpxmo/employee-scheduling.htm [14.3.2023]
[74] https://docs.oracle.com/en/industries/retail/retail-xstore-point-of-service/22.0/rpxmo/employee-maintenance.htm [14.3.2023]
[75] Ibid.
[76] https://docs.oracle.com/en/industries/retail/retail-xstore-point-of-service/22.0/rpsug/introduction-base-oracle-retail-xstore-point-service-reports.htm [14.3.2023]
[77] https://www.oracle.com/industries/retail/products/, https://docs.oracle.com/en/industries/retail/ [14.3.2023]
[78] https://www.oracle.com/industries/retail/cloud/#tab4 [14.3.2023]

In addition to monitoring the behavior and work performance of cashiers and salespersons, Oracle's retail systems offer a wide range of features to operate stores, including time and attendance management, shift scheduling and demand forecasting, as well as task management for different kinds of work activities ranging from setting up display windows to cleaning restrooms. The work of **shelf stockers** moving merchandise items between the backroom and the shelves in a store can be turned into a process that is almost completely mediated by an algorithmic system, directing and tracking their every step. The system can automate task allocation based on real-time data on sales and capacity. It directs workers via handheld devices that display automatically generated "pick" lists and creates a digital record of every work activity based on data from barcode scanners. When fully implemented, it represents a form of **algorithmic management** that does not leave much room for agency and discretion at work. As Evans and Kitchin (2018) summarize, such a system "actively divorce[s] labour from the reasons for doing the task, as allocated by opaque systems". It is a "regime of control, with worker movement highly modulated – that is, planned, controlled, scheduled and timed – for maximum efficiency".

While a **legal assessment** of Oracle's software with respect to its compliance with the GDPR and other regulatory requirements is beyond the scope of this case study, the findings in the previous sections create the impression of a general disregard for employee data protection. The systems enable far-reaching and intrusive employee monitoring and control based on extensive personal data processing. It is remarkable that many reports and dashboards shown in the documentation display information on named employees, some of them even on named customers. Employers can certainly customize Oracle's products, services and reports, and they can decide to disable certain features. The software documentation and promotional materials, however, often show the most intrusive options.

Oracle's data mining solutions for the retail industry (see section 2.2) are specifically problematic. One predictive model feeds sensitive attributes such as **gender, age, disability and language** into machine learning models that promise to estimate how productive and profitable retail workers might be in the future. Another model promises to identify groups of employees who are likely to perform better at a certain store or in a certain shift than others. Oracle suggests using these models for new job candidates and employee allocation. This kind of worker profiling based on predictive modeling is highly questionable. First, the models use sensitive attributes that are considered "special category" data under the GDPR,[79] which makes lawful processing for employment decisions difficult or even impossible in Europe. Second, the use of these sensitive attributes can easily lead to illegal discrimination both in the US[80] and in Europe[81]. Third, even if the models did not use sensitive data, they may still lead to discrimination, inaccurate and unreliable predictions or simply represent "pseudoscience".[82]

[79] Article 9 GDPR

[80] https://www.eeoc.gov/prohibited-employment-policiespractices [14.3.2023]

[81] https://ec.europa.eu/social/main.jsp?catId=166&langId=en [14.3.2023]

[82] See e.g. Mona Sloane, Emanuel Moss, Rumman Chowdhury (2022): A Silicon Valley love triangle: Hiring algorithms, pseudo-science, and the quest for auditability. Patterns, Volume 3, Issue 2, 2022. https://doi.org/10.1016/j.patter.2021.100425; Kaltheuner, Frederike (eds) (2021): Fake AI. Meatspace Press, 2021

3. Performance monitoring and automated task allocation in restaurants and hotels

Oracle also offers a range of enterprise software products and cloud-based services[83] for the hospitality sector, which help businesses such as restaurants, bars and hotels manage and monitor servers, kitchen personnel, room attendants and other workers.

The company states that its restaurant technology solutions are installed at 350,000 locations across 180 countries,[84] including at table service and quick service restaurants, drive-throughs, take-out services and "ghost kitchens" for food delivery.[85] This includes systems for small businesses and large companies such as global quick service chains and franchise operators, as well as for huge venues such as stadiums, arenas, convention centers and theme parks.[86] Oracle's hotel management systems promise to provide "fiscal and legal compliance" in 200 countries and are used to manage 4.8 million rooms at 40,000 locations, according to the company.[87] This includes software to operate large hotel chains and resorts, vacation rentals, hostels and campuses, casinos and even cruise ships.[88] Oracle lists customer testimonials from several European countries.[89]

Like other large vendors, the company sells its products and services with the help of partner firms, who resell and customize them for particular clients. For its restaurant and hospitality solutions, Oracle lists dozens of partners across the world, including in several European countries.[90] For example, the German firm HRS, which claims to be "Oracle's largest hospitality partner worldwide", claims to serve more than 10,000 customers.[91]

3.1 Performance monitoring of servers and other restaurant workers

Even more than in retail, POS systems have evolved into powerful software to manage almost every aspect of work in restaurants, bars and cafes – from taking orders to serving food to charging the bill. Under the brand names "MICROS" and "Simphony", Oracle offers both POS hardware and software.[92] To gain customers, the company sells some of its restaurant hardware for a symbolic price of $1.[93] The cheapest software option for small businesses is $55 a month.[94] **Data recorded by the POS system** contains extensive information about the work carried out by

[83] https://docs.oracle.com/en/industries/food-beverage/, https://docs.oracle.com/en/industries/hospitality/hotels.html [16.3.2023]
[84] https://www.oracle.com/industries/food-beverage/ [16.3.2023]
[85] https://www.oracle.com/industries/food-beverage/restaurant-pos-systems/table-service-pos/, https://www.oracle.com/industries/food-beverage/restaurant-pos-systems/quick-service-pos/, https://www.oracle.com/industries/food-beverage/restaurant-pos-systems/drive-thru-pos/, https://www.oracle.com/industries/food-beverage/ghost-kitchens/ [16.3.2023]
[86] https://www.oracle.com/industries/food-beverage/restaurant-pos-systems/simphony-pos/, https://www.oracle.com/industries/food-beverage/sports-entertainment/ [16.3.2023]
[87] https://www.oracle.com/industries/hospitality/ [16.3.2023]
[88] https://www.oracle.com/a/ocom/docs/industries/hospitality/opera-vacation-ownership-system.pdf, https://www.oracle.com/industries/hospitality/products/suite8-property.html, https://www.oracle.com/industries/hospitality/cruise/ [16.3.2023]
[89] https://www.oracle.com/industries/hospitality/customer-successes/ [16.3.2023]
[90] https://partner-finder.oracle.com/catalog/?search=%5B%7B%221%22%3A%22cloud-cloud-re-sale%22%2C%222%22%3A%22%22%2C%223%22%3A%5B%22expertise630%22%5D%2C%224%22%3A%22%22%7D%5D, https://partner-finder.oracle.com/catalog/?search=%5B%7B%221%22%3A%22cloud-cloud-re-sale%22%2C%222%22%3A%22%22%2C%223%22%3A%5B%22expertise790%22%5D%2C%224%22%3A%22%22%7D%5D [16.3.2023]
[91] https://www.hrsinternational.com/en/company/about-hrs [16.3.2023]
[92] https://www.oracle.com/industries/micros/, https://www.oracle.com/industries/food-beverage/restaurant-pos-systems/simphony-pos/ [16.3.2023]
[93] https://www.oracle.com/industries/food-beverage/restaurant-pos-systems/pos-hardware/ [16.3.2023]
[94] https://www.oracle.com/industries/food-beverage/restaurant-pos-systems/simphony-pos/ [16.3.2023]

servers and other workers in a restaurant. Oracle offers several software modules for back-office operations[95] and "restaurant analytics"[96] that provide managers with reports about employee performance.

Figure 5 (left) shows a report that displays performance metrics for named employees, including about the number of guests they served, the number of "table turns", the average spend per guest and the total amount of their sales. Employees are ranked by their sales performance.

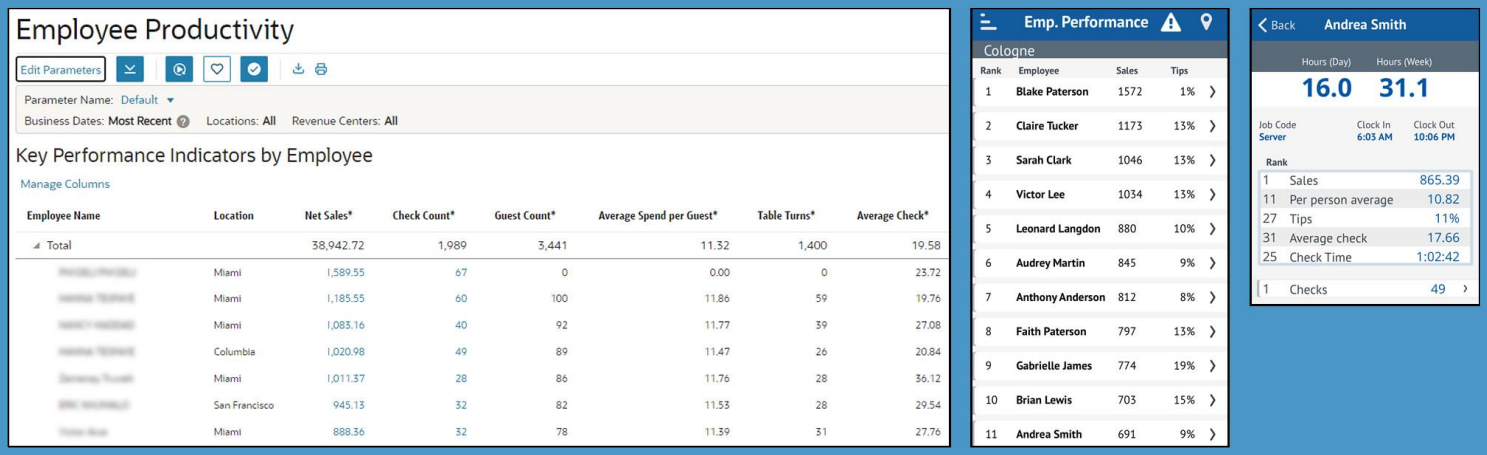

Figure 5: Oracle reports and rankings on the performance of restaurant workers[97]

As figure 5 (center) shows, managers can also use a mobile app provided by Oracle to view a ranked list of workers, including information on their sales performance and the tips they received from guests. The detail screen in figure 5 (right) indicates that the server in this example has worked 16 hours on the given day. During this time, she handled 49 checks (i.e. restaurant bills) totaling 865.39 in sales, which ranks her first among the team. On average, she made 10.82 per guest and received an 11% tip, which gives her a rank of 11 in average sales per guest and a rank of 27 in average tips received.

Rewarding performance, competition among workers. Oracle suggests that restaurants should use the mobile report in figure 5 (center) to "measure and reward performance" and to "compare performance rankings among employees" in order to provide "reward and competition opportunities".[98] The "employee productivity" report shown in figure 5 (left) serves to "identify" a restaurant's "top performing employees and underperformers", according to Oracle. The report is customizable and can contain many attributes, for example:[99]

- Employee name, number of guests, number of table turns, average time guests spend at a table
- Total sales, sales per working hour, average check, average sales per check, average sales per guest

[95] https://docs.oracle.com/en/industries/food-beverage/back-office/20.1/rarrg/index.html [16.3.2023]
[96] https://www.oracle.com/industries/food-beverage/restaurant-pos-systems/restaurant-analytics/ [16.3.2023]
[97] Figures © Oracle. The figures serve as basis for the discussion of the corporate practices examined in this study. Sources: Oracle Food and Beverage, Enterprise Back Office 20.1, Reporting and Analytics User Guide, https://docs.oracle.com/en/industries/food-beverage/back-office/20.1/rause/c_getting_started_navigating.htm [15.3.2023]; Oracle Hospitality InMotion Mobile, Release 3.3, Quick Reference Guide, https://docs.oracle.com/en/industries/food-beverage/back-office/20.1/inmqr/c_emp_perf.htm, https://docs.oracle.com/en/industries/food-beverage/back-office/20.1/inmqr/c_emp_detail.htm [15.3.2023]
[98] https://www.oracle.com/us/industries/oracle-micros-inmotion-mobile-2763407.pdf [16.3.2023]
[99] https://docs.oracle.com/en/industries/food-beverage/back-office/20.1/rarrg/c_emp_prod_tsr_add.htm [16.3.2023]

- Lost sales opportunity ("additional sales the employee could have made if they achieved the overall average sales per guests")
- Total tips, average tip percent, lost tip opportunity ("additional tips the employee could have made if they achieved the overall average tip amount")

For each performance metric, rankings of the "top and bottom 5 employees" are available, with "employees ranked from best to worst".[100] Managers can access information about the types of menu items sold by an employee[101] or details about charged and cash tips[102] and can drill down into the full list of a worker's transactions.[103]

The "employee exceptions" report shows information about **error corrects, returns and voids** per employee.[104] A similar report, which can be used for "loss prevention", shows "employee exceptions that exceed certain thresholds".[105] An earlier software version contained an "employee control" report, which "identifies employees with suspicious behavior and analyzes that behavior over time".[106]

The system also provides "labor" and "time card" reports that show **typical HR information** on the employees' clock in and out times, hours, overtime hours and pay. These reports also contain performance metrics on sales and tips, as well as information on "clock out status", which can be relevant for disciplinary action, and can contain values such as "on time", "early", "late", "early from break" and "late from break". As in every report, rankings of the "top and bottom 5 employees" are displayed for each metric.[107] Another report lists adjustments to the recorded clock in and clock out times made by store managers.[108]

3.2 Table management and automated "service alerts"

When fully implemented, Oracle's restaurant technology can create a digital representation of almost anything that happens at a place, increasing the potential for digital direction and control. Restaurants can, for example, create a panoptic map that visualizes every table and seat in the venue. Based on data that workers enter into the POS system, the map can display real-time information about the current number of guests seated at each table and the time since their arrival,[109] as figure 6 (right) shows.

The "table management" functionality can also display the duration since the last service interaction on a table. While "check alerts" are based on the time since guests have been seated at the table and remind workers to collect the bill, **service alerts** encourage them to stop by the table once again.[110]

[100] Ibid.
[101] https://docs.oracle.com/en/industries/food-beverage/back-office/20.1/rarrg/c_emp_sales_mix_detail_add.htm [16.3.2023]
[102] https://docs.oracle.com/en/industries/food-beverage/back-office/20.1/rarrg/c_tips_add.htm [16.3.2023]
[103] https://docs.oracle.com/en/industries/food-beverage/back-office/20.1/rarrg/c_all_checks_for_emp.htm [16.3.2023]
[104] https://docs.oracle.com/en/industries/food-beverage/back-office/20.1/rarrg/c_emp_exceptions_tsr_add.htm [16.3.2023]
[105] https://docs.oracle.com/en/industries/food-beverage/back-office/20.1/rarrg/c_emp_threshold_exceptions.htm [16.3.2023]
[106] https://www.oracle.com/us/industries/reporting-analytics-adv-cloud-2763408.pdf [16.3.2023]
[107] https://docs.oracle.com/en/industries/food-beverage/back-office/20.1/rarrg/c_time_card_detail_add.htm [16.3.2023]
[108] https://docs.oracle.com/en/industries/food-beverage/back-office/20.1/rarrg/c_time_card_adj.htm [16.3.2023]
[109] https://docs.oracle.com/en/industries/food-beverage/simphony/19.5/simcg/c_tms_dining_table_status.htm [16.3.2023]
[110] https://docs.oracle.com/en/industries/food-beverage/simphony/19.5/simcg/c_tms_alerts.htm [16.3.2023]

3.3 Task allocation and performance control for kitchen workers

Oracle's restaurant systems do not stop at managing and monitoring frontline workers, but also provide digital technology to make the kitchen more efficient. The company's "kitchen display system" (KDS), which is part of its POS solutions for restaurants, promises businesses to "optimize kitchen workflows, food quality, and speed of service". Based on predefined **target values** for the cooking time of each menu item down to the minute, the system prioritizes and distributes guest orders, and assigns them as tasks to kitchen workers, who see their tasks on a video monitor that displays orders, notifications, timers and alerts.[111]

Figure 6: Oracle "kitchen display" and "table management" systems[112]

Figure 6 (left) shows an example screen that displays incoming orders that have been received both from the restaurant and through the web. Each order on the screen contains information about the ordered menu items (e.g. "Sirloin Steak") and its components (e.g. "Steak", "Chips", "Sauce"), an **active timer** that shows the minutes and seconds that have passed since the order was received, and the order number (e.g. "CHK 2000"). Kitchen workers then use the touch screen or an extra "bump bar" to confirm the completion of the preparation of a menu item or component.[113] When the preparation time for an item exceeds the predefined level, the order on the screen turns yellow and then to blinking red when it exceeds another predefined level, **raising an alert**.[114] At the bottom, the screen shows the current average preparation time across all orders. The system can also play audio notifications when a new order appears on the screen or when the priority of an order increases.[115]

Performance targets and task allocation. The system allows for the implementation of complex workflows involving multiple video monitors for different kitchen "stations", which prepare different kinds of food such as hot foods, grill items, soups, salads and desserts.[116] The screens are customizable and can display full orders, menu items or only specific components that should be prepared by a station, including timers for orders, menu items or components.[117] Extra displays for managers and for expeditors, who coordinate and oversee the flow of orders from

[111] https://www.oracle.com/industries/food-beverage/restaurant-pos-systems/kds-kitchen-display-systems/ [17.3.2023]
[112] Figures © Oracle. The figures serve as basis for the discussion of the corporate practices examined in this study. Source: Oracle Simphony Cloud POS for Table Service Restaurants, p. 8 and 5, https://www.oracle.com/webfolder/s/quicktours/ind/gqt-ind-fbgbu-simphony/index.html [15.3.2023]
[113] https://docs.oracle.com/en/industries/food-beverage/simphony/19.5/kdscu/c_kds_bump_bar_templates_scancodes.htm [17.3.2023]
[114] https://docs.oracle.com/en/industries/food-beverage/simphony/19.5/kdscu/r_kds_chit_layouts.htm [17.3.2023]
[115] https://docs.oracle.com/en/industries/food-beverage/simphony/19.5/kdscu/t_kds_order_device_config.htm [17.3.2023]
[116] https://docs.oracle.com/en/industries/food-beverage/simphony/19.5/kdscu/c_kds_link_prep_stations.htm [17.3.2023]
[117] https://docs.oracle.com/en/industries/food-beverage/simphony/19.5/kdscu/r_kds_chit_layouts.htm [17.3.2023]

servers to the kitchen, can show information about orders, preparation tasks, the "speed of service" and deviations from the targets.[118] Various mechanisms for "routing", "capacity scheduling" and "load balancing" can automate how work is prioritized and distributed to preparation stations based on their predicted capacity. The predefined target times for the preparation of each type of menu item and component serve as the basis both for automated task allocation and for performance control mechanisms such as timers and alerts. Oracle's documentation contains several example scenarios that discuss how food items with preparation times of one or two minutes are routed to stations, delayed, or queued in order to appear on the screen one minute later.[119] The system can also prioritize items with long preparation times, "recalled" orders, "VIP" orders or guest orders with a high check amount.[120]

The kitchen assembly line. Features that "break down the preparation of a complex item into more distinct steps", subdividing menu items into components that are prepared in a similar manner, are "designed for kitchen environments that have staff working in an assembly-line fashion", according to the documentation. In addition, so-called "pre-production" can serve to "streamline kitchen production by having some prep work done in advance for specific menu items", allowing "orders to be prepared in a more timely manner".[121] When preparation is completed, components are placed at "collection points", where servers or "food runners", who assist servers in taking the items to the customers' tables, can pick them up. So-called "runner chits", i.e. printed pieces of paper, can help runners with delivery.[122] In quick-service or drive-through restaurants, orders can get dispatched to the kitchen as they are being ordered, as opposed to waiting for the customer to pay the check. Order changes are reflected in real-time.[123]

Earlier workflows in restaurant kitchens involved printing POS orders on kitchen printers. The display-based system serves a similar purpose but creates more comprehensive digital records of tasks and allows for more comprehensive task allocation and control. Oracle states that the "paperless kitchen" improves "operations", increases "kitchen efficiency", provides a "real-time view of restaurant operations" and "captures performance data for reporting and analytics".[124] Available **reports** show, for example, information on preparation times, the number of recalls and a comparison between a menu item's predefined preparation time and the actual average preparation time.[125] Other "kitchen performance" reports show information about the preparation time and the number of prepared items by station,[126] as well as the number of alerts that indicate that kitchen workers exceeded predefined cook times.[127] Data can also be exported to other systems in real time.[128]

[118] https://docs.oracle.com/en/industries/food-beverage/simphony/19.5/kdscu/c_kds_display_types.htm [17.3.2023]
[119] https://docs.oracle.com/en/industries/food-beverage/simphony/19.5/kdscu/c_kds_capacity_scheduling.htm, https://docs.oracle.com/en/industries/food-beverage/simphony/19.5/kdscu/c_kds_capacity_scheduling_examples.htm, https://docs.oracle.com/en/industries/food-beverage/simphony/19.5/kdscu/c_load_balancing.htm [17.3.2023]
[120] https://docs.oracle.com/en/industries/food-beverage/simphony/19.5/kdscu/c_kds_prioritize_mi.htm, https://docs.oracle.com/en/industries/food-beverage/simphony/19.5/kdscu/t_order_device_routing_check_amount.htm [17.3.2023]
[121] https://docs.oracle.com/en/industries/food-beverage/simphony/19.5/kdscu/c_kds_production_items.htm, https://docs.oracle.com/en/industries/food-beverage/simphony/19.5/kdscu/c_kds_preproduction_items.htm [17.3.2023]
[122] https://docs.oracle.com/en/industries/food-beverage/simphony/19.5/kdscu/c_kds_dynamic_display.htm, https://docs.oracle.com/en/industries/food-beverage/simphony/19.5/kdscu/c_kds_runner_chits.htm [17.3.2023]
[123] https://docs.oracle.com/en/industries/food-beverage/simphony/19.5/kdscu/c_kds_dom.htm [17.3.2023]
[124] https://docs.oracle.com/en/industries/food-beverage/simphony/19.5/kdscu/c_kds_basics.htm [17.3.2023]
[125] https://docs.oracle.com/en/industries/food-beverage/simphony/19.5/kdscu/c_kds_reports.htm [17.3.2023]
[126] https://docs.oracle.com/en/industries/food-beverage/back-office/20.1/rarrg/c_kds_station_sum_tsr.htm [17.3.2023]
[127] https://docs.oracle.com/en/industries/food-beverage/back-office/20.1/rarrg/c_kitchen_performance.htm [17.3.2023]
[128] https://docs.oracle.com/en/industries/food-beverage/simphony/19.5/kdscu/c_kds_posting_files.htm [17.3.2023]

3.4 Task allocation and performance control for hotel room attendants

Under the brand name "OPERA", Oracle sells hotel and property management systems to operate everything from smaller hotels to large resorts. They integrate with the company's POS and restaurant management software, as described in the previous sections, can be used on tablets and other mobile devices, and contain functionality to manage financials, bookings, rooms, communication with guests, front desks, billing, food service, maintenance, housekeeping, planning and reporting.[129] This includes mechanisms to manage tasks and allocate work, for example, sales activities such as calls and follow-up correspondence,[130] service requests such as guest complaints,[131] room maintenance tasks such as changing a light bulb or repairing a faulty air conditioning unit,[132] and housekeeping tasks such as cleaning rooms and replacing towels.[133]

Task allocation and performance targets. The system provides extensive functionality to assign daily tasks to hotel room attendants,[134] keep track of their work and set target values for the amount of time they should spend cleaning each room.

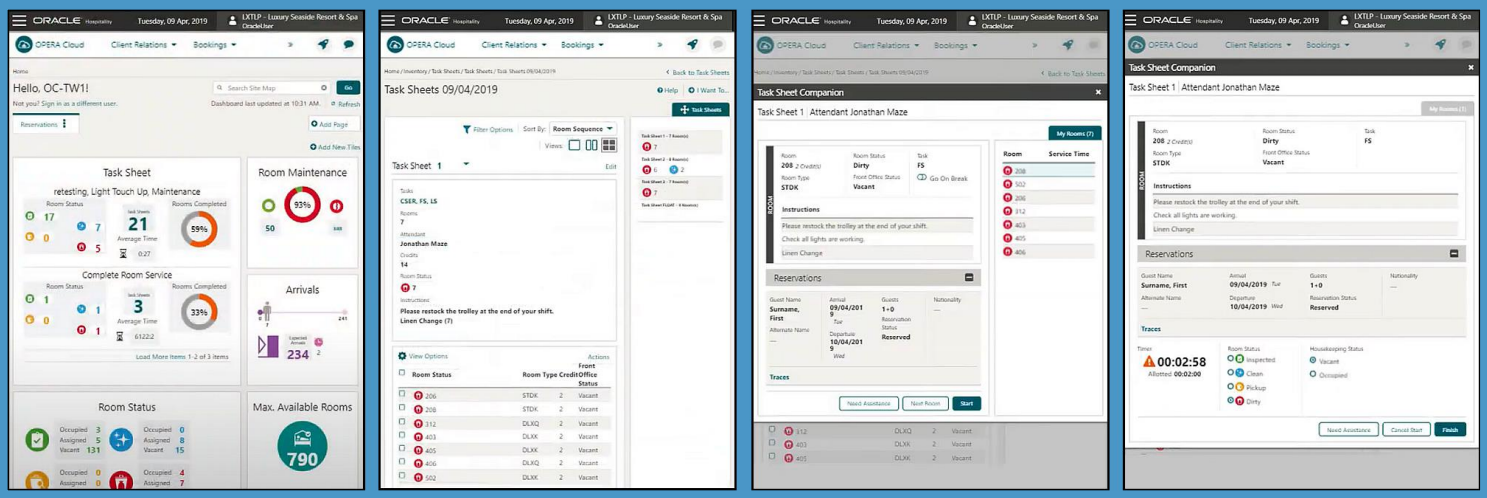

Figure 7: Oracle task allocation for room attendants in hotels[135]

Figure 7 (center right) shows the screen of a room attendant's mobile device. The worker in this example has been assigned a list of seven rooms to clean. The first room has the status "dirty". The task code "FS" indicates that a "full service" is required.[136] Additional instructions include changing the linen and checking if all the lights are working. As soon as the attendant starts to work on the room, a timer appears that counts the minutes and seconds that have passed, as well as the predefined time allotted for cleaning the room, as shown in figure 7 (right). The

[129] https://www.oracle.com/industries/hospitality/hotel-property-management/, https://www.oracle.com/industries/hospitality/hotel-property-management/hotel-pms-software, https://www.oracle.com/co/a/ocom/docs/industries/hospitality/hosp-opera-cloud-property-manage-ds.pdf [20.3.2023]

[130] https://docs.oracle.com/en/industries/hospitality/opera-cloud/23.1/ocsuh/t_osem_creating_and_editing_activities.htm [20.3.2021]

[131] https://docs.oracle.com/en/industries/hospitality/opera-cloud/23.1/ocsuh/t_managing_reservations_service_requests.htm [20.3.2021]

[132] https://docs.oracle.com/en/industries/hospitality/opera-cloud/23.1/ocsuh/t_maintenance_managing_maintenance_requests.htm [20.3.2021]

[133] https://docs.oracle.com/en/industries/hospitality/opera-cloud/23.1/ocsuh/c_tasksheets_task_sheets.htm [20.3.2021]

[134] https://docs.oracle.com/en/industries/hospitality/opera-cloud/23.1/ocsuh/c_housekeeping_task_sheets.htm [20.3.2021]

[135] Figures © Oracle. The figures serve as basis for the discussion of the corporate practices examined in this study. Source: Hospitality Documentation–OPERA Cloud 20.4: Task Sheet Companion, Oracle YouTube channel, 30.9.2020, min 0:10, 0:36, 0:52, 1:23, https://www.youtube.com/watch?v=24EwuE4-AF4 [15.3.2023]

[136] https://docs.oracle.com/en/industries/hospitality/opera-cloud/23.1/ocsuh/t_admin_inventory_configuring_room_type_task_schedules.htm [20.3.2021]

alert icon indicates that the worker has already spent two minutes and 58 seconds on the room, which is more than the allotted two minutes. When work in a room is completed, the attendant updates the room status from "dirty" to "clean". Going on a break must also be indicated in the app.

Figure 7 (left) shows a dashboard for the manager that gives an overview of the maintenance and cleaning status of the rooms in the hotel and displays how many rooms have been "completed", including the average time of service. Figure 7 (center left) shows how a manager has assigned a so-called "task sheet" to this particular room attendant in the example, indicating that seven rooms with the status "dirty" must be cleaned.

Automated task allocation. The system is built on the concept of "credits", which are "units to measure the housekeeping efforts to clean a room".[137] Housekeeping tasks can be distributed to workers based on the number of credits assigned to each task. As figure 7 (center left) shows, the room attendant in this example has been ordered to clean seven rooms. Cleaning one of these rooms is worth two credits, amounting to 14 credits for all seven rooms. The target time shown in figure 7 (right) is two minutes, which suggests that the number of credits represents the available number of minutes it takes to work on the task in this example. According to the documentation, managers can specify the number of credits required to clean a room for each type of room and for each type of task, such as cleaning an occupied room or cleaning a room after guest departure.[138] In addition, they can configure a number of task scheduling templates for different types of cleaning tasks, rooms and floors that define instructions and rules for the task allocation process, such as the maximum number of credits to be assigned to a single attendant.[139]

The system can then automatically generate "task sheets", which "organize room cleaning tasks"[140] and "inform housekeeping room attendants about their daily work assignments".[141] Task sheets can be generated for an individual attendant, for groups of attendants or for all available attendants on a daily basis.[142] The system can add extra credits for cleaning tasks that involve changing the floor, rooms that require more effort than others, or for a set of rooms with many departures. Even the time allotted for activities other than cleaning such as team meetings can be specified in the form of credits.[143] Room attendants can then access the generated task sheets from their mobile devices, as shown in figure 7 (center right). Managers can still also manually create task sheets.[144]

The system replaces printed task sheets with "real-time, interactive housekeeping task management", as Oracle puts it.[145] The company refers to it as a "management tool" that helps to "balance the staff workload",[146] which "will make it easy" to allocate housekeeping tasks "evenly and fairly" to attendants.[147]

Performance control, forecasting and bonus schemes. The "attendant console" enables managers to "evaluate the progress of each housekeeping room attendant and monitor the time taken to service a room".[148] The report shows the number of completed credits compared to the number of assigned credits for an attendant task sheet, as

[137] https://docs.oracle.com/cd/F18689_01/doc.193/f28206/t_rooms_managing_rooms.htm [20.3.2021]
[138] https://docs.oracle.com/en/industries/hospitality/opera-cloud/23.1/ocsuh/t_rooms_managing_rooms.htm [20.3.2021]
[139] https://docs.oracle.com/en/industries/hospitality/opera-cloud/23.1/ocsuh/t_tasksheets_generating_task_sheets.htm [20.3.2021]
[140] https://docs.oracle.com/cd/F18689_01/doc.193/f28206/c_tasksheets_task_sheets.htm [20.3.2021]
[141] https://docs.oracle.com/en/industries/hospitality/opera-cloud/23.1/ocsuh/c_tasksheets_task_sheets.htm [20.3.2021]
[142] https://docs.oracle.com/en/industries/hospitality/opera-cloud/23.1/ocsuh/t_tasksheets_generating_task_sheets.htm [20.3.2021]
[143] Ibid.
[144] https://docs.oracle.com/en/industries/hospitality/opera-cloud/23.1/ocsuh/c_tasksheets_task_sheets.htm [20.3.2021]
[145] https://docs.oracle.com/en/industries/hospitality/opera-cloud/23.1/ocsuh/t_tasksheets_servicing_room_tasksheet_companion.htm [20.3.2021]
[146] https://docs.oracle.com/cd/F18689_01/doc.193/f28206/c_tasksheets_task_sheets.htm [20.3.2021]
[147] https://docs.oracle.com/en/industries/hospitality/opera-cloud/23.1/ocsuh/t_admin_inventory_configuring_scheduled_task_credit_rules.htm
[148] https://docs.oracle.com/en/industries/hospitality/opera-cloud/23.1/ocsuh/c_attendant_console.htm [20.3.2021]

well as the task completion percentage and the average time spent on a room.[149] In addition, the system provides "forecasting" mechanisms to predict the expected amount of housekeeping work for future dates.[150] The non-cloud version of Oracle's hotel and property management system also offers functionality to award "points" to attendants as an "incentive if attendants work extra rooms on certain days or for a general room attendant bonus scheme".[151]

3.5 Concluding remarks

The systems described in the previous sections use extensive data on work activities carried out by **restaurant servers, kitchen workers and hotel room attendants** for performance and behavior control. Where they determine target times for particular tasks such as preparing food and cleaning a room, they go beyond Oracle's software for the retail industry. Displaying **timers** to workers that put them under immediate pressure to complete a task reflects the logic of the assembly line. In the case of kitchen workers, time-related metrics and targets do not necessarily refer to individual employees but to kitchen "stations". Targeting small groups of employees rather than individuals can still exert peer pressure. Visual notifications such as red-blinking **alerts** when the specified time has been exceeded not only exert additional pressure, but are also recorded and presented in reports that can serve as evidence for employee misconduct at a later point in time. Similarly, service alerts shown to restaurant servers, while possibly helpful, also leave digital traces that may provide evidence about servers not having taken care in a timely manner.

Managing and allocating tasks to kitchen workers and room attendants via kitchen displays and tablets does not completely reinvent how work is carried out in kitchens and hotels. These systems build on earlier practices that relied on orders printed on a kitchen printer or printed task sheets for hotel housekeepers. They represent an incremental change, but by expanding the share of work activities that are subject to digital recording and automated direction, they significantly increase the potential for performance and behavior control. When fully implemented, these systems represent a form of **algorithmic management** that does not leave much room for agency and discretion at work. The system for restaurant kitchens goes even further than the housekeeping system in that it divides work into even smaller tasks, which then become subject to rigid micromanagement and digital control. Automated task allocation based on extensive data, metrics, rules and algorithms that aim to increase productivity and keep costs low carries the risk that even managers could lose sight of the system's impact on workers.

Both the kitchen management and the housekeeping system **structure work and constrain** how employees can interact with the systems. They provide a wide range of complicated configuration options to cover edge cases and deviations from standard procedures. Employees may still have to perform work that does not have an accurate digital representation in the system, which can lead to all sorts of difficulties and absurdities. The kitchen management system, for example, can contain time-related targets for the preparation of each component of each menu item. But when managers fail to create an exhaustive and realistic representation of the required tasks and miss just a few tiny steps, this can quickly accumulate and become a painful mess for workers.

Similarly, the housekeeping system, which uses "credits" as a proxy for the time required to handle a task to automate the allocation of work, must contain exhaustive and realistic definitions of the required tasks and accurately represent every work activity in the form of "credits". Failing to create an exhaustive and realistic representation of the work process in these systems may not only lead to discomfort and stress, but also to deviations between digitally

[149] See e.g. Oracle training vide on the "Attendant Console", 2021, minute 1:13: https://www.youtube.com/watch?v=TjC3mTxEMwo [20.3.2021]
[150] https://docs.oracle.com/en/industries/hospitality/opera-cloud/23.1/ocsuh/t_tasksheets_forecasting_housekeeping_services.htm [20.3.2021]
[151] https://docs.oracle.com/cd/E98457_01/opera_5_6_core_help/attendant_points.htm [20.3.2021]

mediated work instructions and actual work. When pay relies on flawed digital records about work activities, it may even lead to wage theft. As Juliana Feliciano Reyes (2018) reported, housekeepers experienced a number of problems when Marriot introduced a similar system a few years ago.

Employers can certainly customize Oracle's systems to monitor and control workers and use it in a less intrusive way. In the housekeeping system, they can, for example, deactivate the timers shown to attendants, the "attendant console" that shows metrics to managers and even the whole functionality for automated task allocation based on "credits".[152] In the kitchen management system, they could, for example, choose a display layout that shows menu item orders without a timer.[153] However, employers could also use these systems in an even more intrusive way, for example by integrating them with HR software or exporting the recorded data to other analytics platforms.

Oracle's systems for servers and other restaurant workers use data on guest orders and billing to assess their work performance and behavior. Managers can view **performance rankings** and reports that contain a wide range of metrics on individual employees, ranking them "from best to worst". Performance metrics on the number of table turnovers and guests served can be considered quantitative measures that assess an employee's speed of work. Ranking servers by their average sales per guest and the deviation from all servers' average sales may in contrast refer to qualitative criteria such as the ability to persuade guests, which involves affective work like their performance of friendliness. Ranking servers by the tips they receive from guests may represent a form of measuring employee performance based on measuring "customer satisfaction", which may rely even more on affective work.

While Oracle's reporting software for restaurants does not directly provide functionality to make **decisions about workers** based on the data, the company suggests using the reports to "reward performance" and provide "competition opportunities", as well as to identify "underperformers" or the "bottom 5 employees". This kind of monitoring can put workers under pressure. Furthermore, the calculated metrics raise the question of whether they really measure what they claim to measure. They may also rely on circumstances that are beyond the control of the employees. The system also provides reports that aim to identify "employees with suspicious behavior" for fraud and "loss" prevention. Another report that contains typical HR information, such as clock in and out times, overtime hours and pay, also contains information that can be relevant for **disciplinary action**, such as data on employees returning "early" or "late" from a break. The same report contains performance metrics on sales and tips.

While a **legal assessment** of Oracle's software with respect to its compliance with the GDPR is beyond the scope of this case study, it is notable that the latest cloud-based version of its "Simphony" software,[154] which underlies much of the functionality for managing restaurant workers described in the previous sections, appears to rely on employee "consent" for personal data processing. According to the documentation, employee consent must be obtained before "entering and storing the personal information of an employee in the system".[155] It is generally almost impossible to rely on employee consent under the GDPR.[156] The documentation for the reporting and analytics functionality states that transaction details on restaurant work are retained for 3 months by default (up to 36 months). Aggregate daily "totals" and time card data is retained for 13 months by default (up to 48/120 months).[157]

---

[152] https://docs.oracle.com/en/industries/hospitality/opera-cloud/22.2/ocsuh/c_opera_controls_room_management.htm [22.3.2023]
[153] https://docs.oracle.com/en/industries/food-beverage/simphony/19.5/kdscu/r_kds_chit_layouts.htm [23.3.2023]
[154] https://docs.oracle.com/en/industries/food-beverage/simphony/19.5/simrn/index.html [22.3.2023]
[155] https://docs.oracle.com/en/industries/food-beverage/simphony/19.5/simcg/c_privacy_personal_data_mgmt.htm [23.2.2023]
[156] See e.g. https://commission.europa.eu/law/law-topic/data-protection/reform/rights-citizens/how-my-personal-data-protected/can-my-employer-require-me-give-my-consent-use-my-personal-data_en [22.3.2023]
[157] https://docs.oracle.com/en/industries/food-beverage/back-office/20.1/rarrg/c_data_retention_limits.htm [22.3.2023]

List of figures

References

Berggren, C and Wrangborg, J (2022): Ständigt övervakad på jobbet. Handels rapporter 2022:1. Online: https://mb.cision.com/Public/168/3512251/a68379fbb7199204.pdf

Braverman, H. (1974): Labor and Monopoly Capital: The Degradation of Work in the Twentieth Century. New York, Monthly Review Press.

Christl, Wolfie (2021): Digitale Überwachung und Kontrolle am Arbeitsplatz. Von der Ausweitung betrieblicher Datenerfassung zum algorithmischen Management? Eine Studie von Cracked Labs, 2021. Online: https://crackedlabs.org/dl/CrackedLabs_Christl_UeberwachungKontrolleArbeitsplatz.pdf

Davis, Bernard; Lockwood, Andrew; Pantelidis, Ioannis S.; Alcott, Peter (2018): Food and Beverage Management. 6th Edition. Routledge, 2018.

Evans L. and Kitchin R. (2018): A smart place to work? Big data systems, labour, control and modern retail stores. New Technology, Work and Employment, 33, 44–57. DOI:10.1111/ntwe.12107

Frances, Jennifer and Garnsey, Elizabeth (1996): Supermarkets and suppliers in the United Kingdom: System integration, information and control. Accounting, Organizations and Society, V 21, 6, 1996. DOI:10.1016/0361-3682(96)00001-3

Gilbert, Abigail and Thomas, Anna (2021): The Amazonian Era. The gigification of work. Institute for the Future of Work, May 2021. Online: https://www.ifow.org/publications/the-amazonian-era-the-gigification-of-work

Kansakar, Prasanna; Munir, Arslan; Shabani, Neda (2019): Technology in the Hospitality Industry: Prospects and Challenges. IEEE Consumer Electronics Magazine. 8. 60-65. DOI: 10.1109/MCE.2019.2892245

Kokaz, Karolin; Murphy, Hilary; Murphy, Catherine (2011): An investigation of data management and property management systems in hotels. Tourism and Hospitality Management. 17. 101-114. DOI: 10.20867/thm.11.1.8.

Marvil, Charles (2015): Technology Purchasing Trends and Influencing Factors for Small to Medium Size Restaurant Operations. A non-thesis research project, Auburn University. Online: https://www.academia.edu/18346614/Technology_Purchasing_Trends_and_Influencing_Factors_for_Small_to_Medium_Size_Restaurant_Operations

Mateescu, Alexandra and Nguyen, Aiha (2019): Algorithmic Management in the Workplace. Data & Society, 2019. Online: https://datasociety.net/wp-content/uploads/2019/02/DS_Algorithmic_Management_Explainer.pdf

Pantelidis, Ioannis (2009): High tech foodservice; an overview of technological advancements. CHME 18th Annual Research Conference, May 2009. Online: https://pure.ulster.ac.uk/en/publications/high-tech-foodservice-an-overview-of-technological-advancements

Reyes, Juliana Feliciano (2018): Hotel housekeeping on demand: Marriott cleaners say this app makes their job harder. The Philadelphia Inquirer, 2.7.2018. Online: https://www.inquirer.com/philly/news/hotel-housekeepers-schedules-app-marriott-union-hotsos-20180702.html

Sánchez-Monedero, Javier und Dencik, Lina (2019): The datafication of the workplace. Working Paper. Cardiff, Data Justice Project, 2019. Online: https://datajusticeproject.net/wp-content/uploads/sites/30/2019/05/Report-The-datafication-of-theworkplace.pdf

Stone, Trevor and Hollier, Robert (2000): Electronic Data Capture and Operational Performance Monitoring: A Supply Chain Perspective. International Journal of Logistics Research and Applications, 3(3), 213–226. DOI:10.1080/713682771

Van Oort, Madison (2018): The Emotional Labor of Surveillance: Digital Control in Fast Fashion Retail. Critical Sociology, 089692051877808. DOI:10.1177/0896920518778087

Van Oort, Madison (2020): Retail worker surveillance goes beyond amazon warehouses. Work In Progress, 28.2.2020. Online: http://www.wipsociology.org/2020/02/28/retail-worker-surveillance-goes-beyond-amazon-warehouses/

Wong, Chien Yaw and McFarlane, Duncan (2007): Radio frequency identification data capture and its impact on shelf replenishment. International Journal of Logistics Research and Applications, 10(1), 71–93. DOI:10.1080/13675560600813117

Wood, Alex J. (2020): Despotism on Demand: How Power Operates in the Flexible Workplace. Cornell University Press, 2020