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Creating Reciprocal Value Through Operational Transparency

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We investigate whether organizations can create value by introducing visual transparency between consumers and producers. Although operational transparency has been shown to improve consumer perceptions of service value, existing theory posits that increased contact between consumers and producers may diminish work performance. Two field and two laboratory experiments in food service settings suggest transparency that 1) allows customers to observe operational processes (process transparency) and 2) allows employees to observe customers (customer transparency) not only improves customer perceptions, but also increases service quality and efficiency. In our fully specified models, the introduction of this transparency contributed to a 22.2% increase in customer-reported quality and reduced throughput times by 19.2%. Laboratory studies revealed that customers who experienced process transparency perceived greater employee effort, and as a consequence, were more appreciative of the employees and valued the service more. Employees who experienced customer transparency felt that their work was more appreciated and more impactful, and thus were more satisfied with their work and more willing to exert effort. We find that transparency, by visually revealing operating processes to consumers and beneficiaries to producers, generates a positive feedback loop through which value is created for both parties.

1. Introduction

At the local Krispy Kreme store, freshly glazed donuts move along on conveyer belts behind glass panes, beckoning customers to observe their production. From fast food chains such as Subway and Chipotle to high-end establishments presenting open kitchens, a wide range of restaurants celebrate the food creation process as much as the final dishes, through designs that introduce visual transparency into the customer experience. Such designs augment the traditional employee experience as well, simultaneously enabling and obliging employees to see and be seen by their customers. We have the intuition that seeing the process matters, and we are often willing to pay a premium for such privilege. But does making the process transparent actually generate substantive benefits, and if so, for whom?

Research has supported the notion that organizations stand to gain by becoming more transparent to both internal and external stakeholders. For example, companies can improve performance by disclosing information about practices, policies (Burke and Logsdon, 1996; Dhaliwal et al., 2011; Du et al., 2007; Pan and Zinkhan, 2006; Tsai et al., 2010), and executive compensation (Lo, 2003). Making companies'

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decision-making processes transparent by involving customers (Franke et al., 2013) and seeking feedback from employees (Fast et al., 2014) could also help satisfy multiple stakeholders. Transparency can be constructive at an interpersonal level and across multiple domains, promoting teamwork (Hackman and Coutu, 2009; Hackman and Wageman, 2004), smoothing social interactions (Pierce et al., 2013), facilitating negotiations (Malhotra and Bazerman, 2007; Ross and Stillinger, 1991), and reducing miscommunication and process errors (Neergaard and Caruso, 2014).

Such dynamics can be quite relevant in considering interactions between consumers and employees, as shared interests and common goals may not be as salient as the frustration and even hostility that may arise (Baker and Cameron, 1996; Fornell and Westbrook, 1979). The present research examines the effects of operational transparency in face-to-face service settings, a mode of service delivery in which transparency occurs simultaneously on both sides. Specifically, building on prior research that highlights the perceptual benefits of revealing operations to customers, our results demonstrate how providing customers and employees with visual access to one another during service delivery can create benefits for both parties.

2. Seeing and Being Seen: Transparency, Perceptions, and Performance

Although firms are increasingly automating service delivery, face-to-face service interactions remain prevalent. Our work highlights how operational transparency in these settings, which allows customers to observe operational processes (*process transparency*) and employees to observe customers (*customer transparency*), contributes to improved perceived and objective performance. Several streams of research from various fields have suggested—but not yet empirically tested—how the benefits of transparency may accrue for both sides. Building upon previous work that has demonstrated the possibility of reciprocal gains between customers and firms (Cialdini, 2009; Regan, 1971; Tidd and Lockard, 1978), we propose that both economic and psychological benefits can be achieved, without compromising production efficiency, when customers and employees can visually access one another.

2.1 Process Transparency: Revealing Operational Processes to Customers

The notion that customers value the service experience as much as they value the final product (Parasuraman et al., 1985) suggests that process transparency may strongly influence customer service perceptions – for better or for worse. On the one hand, allowing customers to observe employees engaged in service delivery could unintentionally undermine firms' efforts to generate customer goodwill. For example, transparency could make salient various undesirable aspects of the service. Furthermore, increasing one's knowledge about the transaction may provide new opportunities to recognize areas for improvement, leading to disappointment with the service and its provider (Parasuraman et al., 1985). Moreover, given that customers form normative beliefs about how they should be treated from past experiences (Bearden and Teel, 1983; Boulding et al., 1993; Churchill and Surprenant, 1982; Tse and

Wilton, 1988), the ability to observe employees could lead customers to develop unfair or unrealistic expectations, undermining their satisfaction on subsequent visits.

On the other hand, when customers cannot observe the process, they may lack the ability to intuit the work involved in the delivery of a service (Parasuraman et al., 1985). Since perceptions of effort can engender feelings of appreciation and gratitude (Mohr and Bitner, 1995; Morales, 2005), the benefits of process transparency may outweigh—and perhaps even preempt—its potential costs. For example, an understanding of the time and effort involved in the production process can enhance perceptions of output quality (Chinander and Schweitzer, 2003; Kruger et al., 2004). Moreover, when customers are emotionally invested in their service provider, which may arise through process transparency, their purchase intentions may withstand dissatisfaction from service failures (Mattila , 2001; Zeelenberg and Pieters, 2004).

Process transparency may engender long-term benefits as well. By increasing perceptions of effort, reciprocity, and gratitude, revealing the process can improve consumers' perceptions of service value (Buell and Norton, 2011), an antecedent. Likewise, the degree to which customers feel bonded to a service provider has been theorized to be a strong predictor of their future purchases (Fournier, 1998; Gremler and Gwinner, 2000). Allowing customers to see employees could especially facilitate this bonding by harnessing the substantial impact of visual information demonstrated in a range of domains and for many consequential outcomes. Visual information is often privileged in perception and decision making (Ambady and Rosenthal, 1993; Benjamin and Shapiro, 2009; Rule and Ambady, 2008; Tsay, 2014, 2013), and can influence and even dominate the use of more relevant metrics of quality. Thus, in considering different types of transparency, visual transparency has the potential to generate more substantive benefits than transparency based on other types of sensory information. Thus, we expect that firms can achieve positive outcomes—by increasing perceptions of effort, appreciation, and service value—when they introduce process transparency that makes employees visually transparent to customers during the service delivery process.

2.2 Customer Transparency: Revealing Customers to Service Providers

Could customer transparency—that is, revealing customers to service providers while they are engaged in the delivery of service—achieve positive outcomes? Given that customers value speedy service (Becker, 1965), firms may find it desirable to reduce heterogeneity in work environments by keeping employees physically separate from customers (Thompson, 1967). It has long been theorized that a high volume of direct customer contact with a service system and its employees diminishes the system's potential to operate at peak efficiency (Chase, 1981, 1978). Moreover, broad or invasive managerial contact can lead to diminished efficiency and lower production performance (Bernstein, 2012), and decrease job satisfaction while increasing turnover intention (Chalykoff and Kochan, 1989). To the extent customers in service contexts may be perceived to be de facto managers, customer transparency may yield similar adverse

effects. Accordingly, organizations may find it in their interests to create work environments that protect employees from such disturbances (Thompson, 1963; Tansik and Chase, 1983).

However, past research addressing customer transparency tends to be theoretical or focused on adverse contexts (e.g., when employees face hostile customers). Other literature hints at the possibility of creating value for employees simply by making their beneficiaries (i.e., customers) transparent to them (Oldham and Hackman, 1980). Because many employees find meaning in their work (Ruiz-Quintanilla et al., 1996) and can gain a higher sense of self-efficacy (Conger and Kanungo, 1988) by having impact, allowing contact with beneficiaries can be an effective strategy to motivate employees. Indeed, respectful interactions with beneficiaries before performing tasks can help maintain employee motivation (Grant et al., 2007). Similarly, merely allowing employees to see customers could lead them to identify more closely with customers (Gino et al., 2010; Small and Loewenstein, 2005).

Customer transparency could also lead employees to focus on the individual, rather than considering customers as an aggregate (Friedrich et al., 1999), thus increasing the likelihood of a higher level of care and service. Finally, customer transparency may provide opportunities for employees to establish a personal connection and positive rapport with customers, important factors that have been shown to improve performance (Spiro et al., 1977). Thus, we propose that customer transparency (i.e., allowing service providers to see customers) can enhance both morale and job performance.

2.3 Research Contribution

Although some prior research suggests that positive outcomes may be achieved from transparent practices, to our knowledge, the current experiments are the first to empirically investigate the effects of transparency on both customers and employees, when they are simultaneously revealed to one another during service delivery processes. Conducted in food service settings, this research contributes to the literatures on service operations, consumer behavior, and organizational behavior in two main ways.

First, we investigate how process transparency, by revealing employees actively engaged in service delivery, affects customer perceptions of the service. Our results suggest that process transparency in face-to-face service settings can improve customer perceptions of service value, and that this tendency generalizes to populations beyond the reach of Western culture. Interestingly, we find that simply revealing the employees themselves is not enough. Rather, customers must observe employees actively engaged in the service delivery process for the benefits of transparency to accrue. Our results further suggest that the perceived gains in performance engendered by transparency are independent of the actual improvements in objective performance. Observing employees engaging in service delivery increases customer perceptions of effort, which promotes feelings of appreciation and enhances perceptions of service value.

Second, we investigate how customer transparency, by revealing customers to actively engaged employees, affects employees both in their behaviors during service delivery and in their general attitudes

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towards their work. We find that revealing customers can improve objective employee service performance. In our first field experiment, customer evaluations of food quality improved 22.2% and throughput time dropped 19.2% relative to the non-transparent baseline, when customers and employees could observe one another. Further investigation suggests that revealing the customers either prior to or during the service delivery process leads employees to feel more appreciated and to believe that their work is more impactful, which separately increases their willingness to exert effort and their satisfaction with their job.

Our work highlights the ways in which process and customer transparency can generate a positive feedback loop through which value is created for both employees and customers. These findings hold particular promise as the gains to service operations emerge without requiring extensive investments or adjustments to existing operating systems, and without incurring the individual, organizational, and societal costs often associated with traditional monitoring strategies (Alder and Ambrose, 2005; Chalykoff and Kochan, 1989; Zweig and Webster, 2002) and training programs.

3. Presentation of Experiments

Across four experiments, including two conducted in the field and two conducted in the laboratory, we investigate the effects of operational transparency on both customers and employees in face-to-face service settings. We demonstrate that instantiating process and customer transparency can be beneficial to both parties, resulting in objective and perceived improvements in service performance.

In the current work, we focus on the food service industry, which was a $2.55 trillion business worldwide in 2012 (Johnson School and Gerson Lehrman Group, 2012), and in 2015, is projected to reach a record high of $709.2 billion in sales and employ 14 million people in the United States alone (National Restaurant Association, 2015). As in many face-to-face service settings, in food service, customers and employees are typically proximate and work is performed on each customer's behalf. Yet this work is often conducted apart from the customers, making food service an ideal setting for exploring how operational transparency and visual access between customers and employees may add value to service interactions in a broad array of domains.

In a first field experiment, conducted in a university dining hall, we introduced process and customer transparency during the delivery of service. We demonstrate that transparency improved customer perceptions of service value and food quality while reducing throughput time (Experiment 1). A subsequent field study, conducted at a different dining hall with a more heterogeneous population, provides converging evidence of the distinct positive effects of operational transparency on perceived and objective service performance (Experiment 2). We next turn to a pair of laboratory experiments to examine the underlying process for both customers and employees. For customers, seeing employees at work can increase perceptions of effort, leading them to value and appreciate the service more highly (Experiment 3). For

employees, seeing customers can increase feelings of being appreciated and perceptions of the impact of their work, which can separately lead to increased job satisfaction and higher intended levels of effort (Experiment 4).
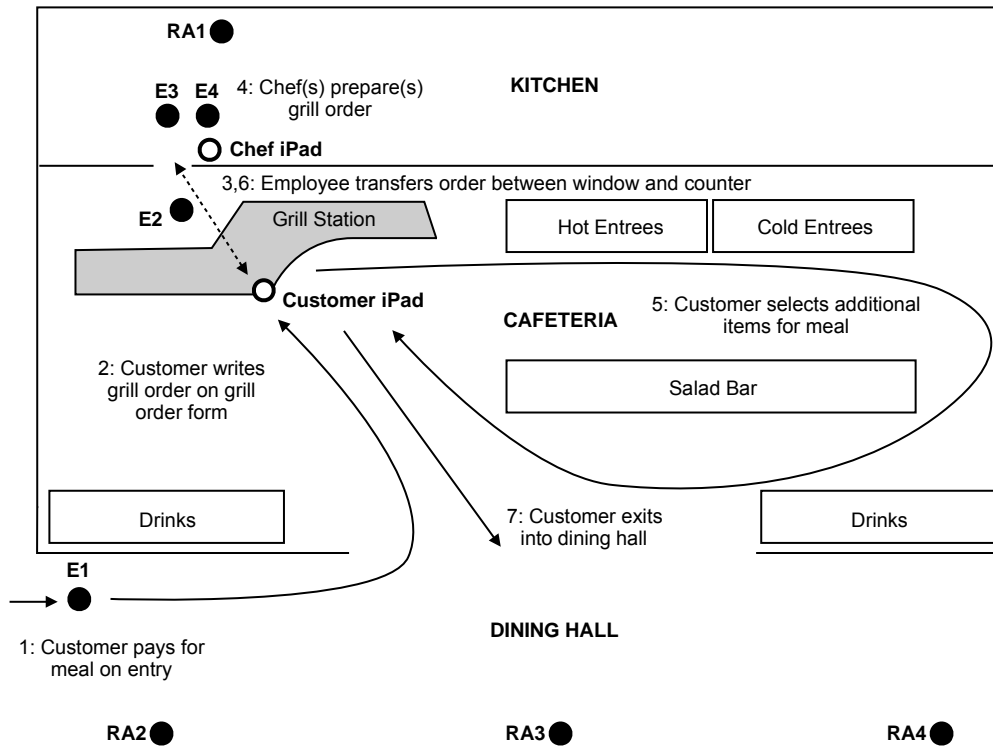

Figure 1: Layout of the cafeteria and typical customer flow during field experiment (Experiment 1)

Note: The label "RA" denotes research assistants; the label "E" represents employees.

3.1 Experiment 1: Effects of operational transparency on employees and customers

In Experiment 1, we test the effects of operational transparency on the quality and efficiency of service delivered by chefs in a university dining hall, as well as on the service value perceptions of their customers. The study took place over a ten-day period in a dining hall at a large university in the Northeastern United States. The dining hall serves up to 1,600 diners for three meals daily, and features four main sections: a grill station, two buffet stations, and a salad bar. Our study focused on the customers and chefs at the grill station, which offered made-to-order items (e.g. eggs, hamburgers, hot dogs, etc.) that were cooked in a kitchen area separated from customers by an opaque wall (**Figure 1**).

Participants. All chefs working at the dining hall during the time of our study were provided informed consent materials in advance of the study and all volunteered to participate ($N = 11$, 100% male; $M_{age} = 47.83$, $SD = 11.58$).[1,2]

Chefs' assignments were designated by dining hall managers through weekly schedules without any input or influence from the research team. Although individual chefs were always assigned to the same shifts (breakfast and lunch shift, or dinner shift), there were numerous roles to which chefs could be assigned within each shift (e.g. prepping ingredients, preparing/refreshing the buffet stations, and staffing the grill station). Based on anticipated demand, one or two chefs were initially assigned to the grill station at the beginning of each shift. However, chefs were cross-trained and regularly rotated to help where needed throughout the kitchen. The absence of crossover employees between shifts and the regular rotation of kitchen staff within shifts facilitated our empirical approach.

We surveyed 299 customers (39.2% female; $M_{age} = 21.1$, $SD = 4.31$) who ordered food from the dining hall grill station during the period of analysis.[3] Customers were predominantly students in a summer school program who had purchased a dining plan and accessed the dining hall for most of their meals. The selection of a sample of summer school students reduced the likelihood of ex-ante familiarity among customers and chefs. No inducements were offered to chefs or customers in exchange for their participation.

Design and procedure. To place an order from the grill station, customers filled out a grill order form and handed it to an employee who transferred the written order through a small window to the chefs in the kitchen. While waiting for their grill order item to be prepared, some customers would linger near the grill station, while others would move through the cafeteria, selecting drinks and additional entrees. Meanwhile, chefs in the kitchen would prepare the item to order and pass the prepared item back through the window along with the original order form, thus ensuring that returning customers received the correct items (**Figure 1**).

We manipulated the level of transparency by installing a pair of iPads with video conferencing software: one in the kitchen in view of the chefs, and another by the order submission station in view of the customers. The iPads were positioned to capture customers submitting orders and chefs preparing grill items. No sound was provided through either iPad, a design that ensured that only visual information was available to customers and employees without the possible effects of dyadic interactions or of information

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[1] We note that all of the chefs who delivered service during this experiment were male. Although this constraint does not allow us to test whether the effects of transparency on employees vary across genders, it does enable us to rule out homophily as an explanation for our results. In particular, as we document, all main effects based on customer survey responses held after controlling for the gender of the customer.

[2] Throughout the paper, *M* is used to denote means and *SD* is used to denote standard deviations.

[3] The demographic questions were asked at the end of the survey; out of 299 total customer participants, 263 reported their gender and 275 reported their age. As our IRB approval did not allow for the collection of identifiable data, we were not able to determine the number of unique individuals who participated in the survey.

conveyed through other modalities (Tsay, 2014, 2013). By installing these silent "virtual windows," we were able to investigate the directional effects of operational transparency in a 2 (customers: observe, do not observe the chefs) × 2 (chefs: observe, do not observe the customers) experimental design. Conditions were enacted using a staggered treatment design. When the iPads were turned on for a population of employees or customers, they were not turned off again until the rehabituation period, which was scheduled in the middle of the experiment (**Figure 2**).

Day	Meal	Customer Transparency	Process Transparency	Condition
Monday (I)	Lunch	Off	Off	Habituation
	Dinner	Off	Off	Habituation
Tuesday	Lunch	Off	Off	No Transparency
	Dinner	Off	Off	No Transparency
Wednsday*	Lunch	On	Off	Customer Transparency
	Dinner	Off	Off	No Transparency
Thursday	Lunch	On	On	Customer + Process Transparency
	Dinner	Off	On	Process Transparency
Friday	Lunch	On	On	Customer + Process Transparency
	Dinner	On	On	Customer + Process Transparency
Saturday (R)	Lunch	Off	Off	Rehabituation
	Dinner	Off	Off	Rehabituation
Sunday (R)	Lunch	Off	Off	Rehabituation
	Dinner	Off	Off	Rehabituation
Monday (I)	Lunch	Off	Off	Habituation
	Dinner	Off	Off	Habituation
Tuesday	Lunch	Off	Off	No Transparency
	Dinner	On	Off	Customer Transparency
Wednesday	Lunch	Off	On	Process Transparency
	Dinner	On	On	Customer + Process Transparency

Figure 2: Summary of staggered experimental treatment design (Experiment 1)

Note: *I* indicates days during which the equipment was installed. Shaded rows represent meals when behaviors were not measured. *R* indicates period of rehabituation, during which the iPads were not installed. * The first Wednesday dinner was excluded from the primary analysis. Please see Footnote 5 for details.

Data collection. During each meal (11:30 am - 2:00 pm for lunch; 4:30 pm - 7:00 pm for dinner), four research assistants collected data from the chefs and customers.[4] One research assistant, who was stationed in the kitchen, observed the behaviors of the chefs and timed the preparation of specific grill items. In order to spread observations evenly, this research assistant recorded the throughput times of approximately ten randomly selected made-to-order grill items every 30 minutes, targeting 50 observations per shift.[5] Three

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[4] We focused our analyses on lunch and dinner, since the menu was identical each day for these meals.
[5] We aimed to use the same research assistant in the kitchen throughout the study to ensure measurement consistency and to eliminate the possibility of the chefs responding differently to different research assistants. This research assistant was not available for one dinner shift, and although we used a substitute research assistant that shift to allow the study to proceed uninterrupted, we have excluded observations from that meal from our analysis. However, we note that including these observations does not impact the relative performance of each condition for the dependent variables we analyze.

additional research assistants were stationed in the dining hall and surveyed the customers.[6] Each of these research assistants circulated and approached customers who had ordered items from the grill station. Because the grill items were distinct from the buffet entrees, diners who had ordered from the grill station were easily identifiable. We set a collection target of 30 survey responses per mealtime, and in order to prevent concurrent observations, assistants were instructed to balance data collection across each meal period, collectively surveying approximately ten diners every 50 minutes.[7] After agreeing to participate, diners were given privacy as they completed a paper-based survey, which was collected by an assistant later in the meal. We note that these four research assistants were introduced before baseline measurements were taken. Hence, the effects attributed to our experimental manipulations are over and above any effect of having extra observers present in the kitchen or dining room.

	No Transparency			Customer Transparency			Process Transparency			Customer + Process Transparency			All		
	n	Mean	Std. Dev.	n	Mean	Std. Dev.	n	Mean	Std. Dev.	n	Mean	Std. Dev.	n	Mean	Std. Dev.
Food satisfaction	82	4.57	1.47	60	5.15	1.23	45	4.87	1.58	108	5.49	1.41	295	5.07	1.46
Perceived value	83	4.44	1.11	60	4.70	1.13	45	4.43	1.14	111	5.19	1.01	299	4.77	1.13
Dinner indicator	83	0.36	0.48	60	0.48	0.50	45	0.67	0.48	111	0.49	0.50	299	0.48	0.50
Employees scheduled	83	5.64	0.48	60	5.52	0.50	45	5.33	0.48	111	5.29	0.46	299	5.44	0.50
Grill order volume (per shift)	83	222.29	30.32	60	356.28	36.79	45	301.00	57.21	111	246.74	35.32	299	270.10	62.80
Age	76	21.70	5.40	54	21.20	3.63	43	20.53	3.06	102	20.90	4.18	275	21.12	4.31
Female pct.	72	0.43	0.50	53	0.30	0.46	39	0.36	0.49	99	0.42	0.50	263	0.39	0.49
Noticed iPads pct.	71	0.24	0.43	54	0.44	0.50	40	0.73	0.45	95	0.69	0.46	260	0.52	0.50
Throughput time (sec.)	125	58.50	43.77	98	72.66	39.18	65	65.02	45.10	185	55.35	38.28	473	61.10	41.36
Consistency	125	(0.78)	0.56	98	(0.75)	0.60	65	(0.80)	0.52	185	(0.77)	0.57	473	(0.77)	0.57
Time frame	125	2.86	1.47	98	2.90	1.45	65	2.74	1.50	185	2.84	1.46	473	2.84	1.47
Employees scheduled	125	5.62	0.49	98	5.46	0.50	65	5.65	0.48	185	5.27	0.45	473	5.45	0.50
Dinner indicator	125	0.38	0.49	98	0.54	0.50	65	0.35	0.48	185	0.44	0.50	473	0.43	0.50
Grill order volume (per shift)	125	226.98	32.87	98	360.48	36.57	65	263.46	57.83	185	252.16	36.20	473	269.50	61.99
Fish sandwich pct.	125	0.07	0.26	98	0.12	0.33	65	0.00	0.00	185	0.10	0.30	473	0.08	0.28
Eggs pct.	125	0.26	0.44	98	0.29	0.45	65	0.38	0.49	185	0.32	0.47	473	0.30	0.46
Egg whites pct.	125	0.38	0.49	98	0.22	0.42	65	0.26	0.44	185	0.21	0.41	473	0.26	0.44
Scrambled eggs pct.	125	0.30	0.46	98	0.37	0.48	65	0.35	0.48	185	0.37	0.48	473	0.35	0.48

Table 1: Summary statistics (Experiment 1)

Dependent measures. We measured the effects of transparency on employees in two ways. First, we used customers' satisfaction with the food they ordered from the grill – "On a scale of 1 to 7, how satisfied are you with today's orders?" – as a measure of user-based quality (Edwards, 1968; Garvin, 1984; Gilmore, 1974). Second, we used the throughput times of made-to-order grill items prepared by the on-duty chefs to measure the efficiency of employee performance ($N = 473$ orders). Data from these quality and efficiency measures should hold implications generalizable across a range of domains, including banking (Walfried et al., 2000), education (Jacob and Lefgren, 2008), healthcare (Chassin and Galvin, 1998; Jha, 2006),

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[6] All studies described in this paper were approved in advance by the authors' Institution Review Board (IRB). All assistants who helped administer these experiments were blind to the hypotheses and were certified to interact with human subjects. Across all studies, copies of informed consent forms were available for all participants, and with the exception of Experiment 2 as described below, no personally identifiable data were collected.

[7] Although precise response rate records were not kept, the vast majority of diners were amenable to participating.

service (Cronin Jr. and Taylor, 1992), technology (Crowston et al., 2006), and the public sector (Rusbult, 1979).

Day	Meal	Condition	Perceived Value	Food Satisfaction	Female Pct.	Mean Age
Tuesday	Lunch	No Transparency	4.67	4.97	33%	23.83
Tuesday	Dinner	No Transparency	4.52	4.53	55%	19.69
Wednesday	Lunch	Customer Transparecny	4.90	5.29	25%	20.81
Wednesday*	Dinner	No Transparency	4.67	5.00	52%	20.15
Thursday	Lunch	Customer + Process Transparency	5.38	5.84	53%	20.28
Thursday	Dinner	Process Transparency	4.62	4.93	38%	20.32
Friday	Lunch	Customer + Process Transparency	5.17	5.42	33%	22.71
Friday	Dinner	Customer + Process Transparency	5.13	5.46	40%	21.23
Tuesday	Lunch	No Transparency	4.04	4.13	38%	21.50
Tuesday	Dinner	Customer Transparency	4.49	5.00	36%	21.60
Wednesday	Lunch	Process Transparency	4.05	4.73	31%	20.90
Wednesday	Dinner	Customer + Process Transparency	5.06	5.21	37%	19.96

Table 2: Summary statistics by day and shift (Experiment 1)

Note: * The first Wednesday dinner was excluded from the primary analysis. Please see Footnote 5 for details.

We also investigated whether customer perceptions of service value are affected. These perceptions are important predictors of longer-term behaviors, such as willingness to pay, satisfaction, and loyalty (McDougall and Levesque, 2000). We measured them using the following adapted four-item scale: "The grill station provides a service I want to use," "The grill station offers a high quality service," "Other people would approve of the grill station," and "I am willing to pay to use the grill station." Participants provided responses on a 7-point scale, and we averaged these four items to create a composite measure of perceived service value. We note that this composite measure had a high Cronbach's Alpha, indicating acceptable internal consistency (α = 0.71) (Sweeney and Soutar, 2001).

Control variables. We also account for a variety of additional factors in our analyses that varied over the period of our study (**Table 1**). In modeling customer satisfaction and perceived value, we control for the meal shift (lunch or dinner), the number of employees scheduled to work in the kitchen during the shift, the number of grill orders placed during the shift (grill order volume), and the age and gender of survey respondents. In addition to the relevant variables described above, when modeling throughput time and employee consistency, we control for the item being produced,[8] as well as indicator variables representing the shift's phase of completion (broken down into 30-minute increments). Due to the non-linear effect of busyness on the rate of employee production (Kc and Terwiesch, 2009; Oliva and Sterman, 2001), we also include a quadratic grill order volume term.[9]

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[8] We limited our observations to fish sandwiches, fried eggs, egg whites, and scrambled eggs. The grill station also served turkey burgers, grilled chicken sandwiches, crispy fish sandwiches, Halal hot dogs, Halal hamburgers, garden burgers, tofu dogs, bean burritos, and chicken patties. We refrained from tracking these items because they were either ordered in extremely limited quantities, or were served directly from warming trays and not actively cooked to order.
[9] We note that grill order volume did not have a non-linear effect on customer evaluations of the service, and that the incorporation of a quadratic grill order volume term reduced the fit of models of customer satisfaction and value perceptions without substantively affecting the coefficients of interest.

We acknowledge that we are not able to include day of week effects or employee fixed effects in our models. Under the staggered treatment design, which was implemented to tease apart the incremental effects of increasing levels of transparency, several of the treatments that lack transparency occur in the beginning of the week and most of the simultaneous customer and process transparency treatments occur during the middle and the end of the week. This design feature leads to collinearity issues when day of week effects are included in our models. Furthermore, IRB concerns about the identifiability of specific employees and the potential ramifications for their employment precluded us from collecting data that would allow us to include employee fixed effects. However, we note that treatments were assigned independent of staffing decisions, and consistently, we show that the primary effects of interest are not driven by outlier values that correspond with any particular day or shift. Rather, result patterns appear to fluctuate by experimental condition (**Table 2**). Moreover, we account for the fact that food service operational performance can vary by day of week through our experimental design, which often tested two different conditions on the same day, and we counterbalanced the presentation of conditions by shift/day across the ten days of our experiment (**Figure 2**).

Analysis and results. We model food satisfaction, throughput time, and perceived value, Y, as linear functions of each treatment condition: (1) *CUST_TRANS_ONLY*, the customer transparency condition, when chefs could observe the customers, but customers could not observe the chefs; (2) *PROCESS_TRANS_ONLY*, the process transparency condition, when customers could observe the chefs, but chefs could not observe the customers; and (3) *BOTH_ONLY*, when chefs and customers could observe each other; as well as a vector of controls, X, as described above. This specification facilitates the direct interpretation of the coefficient corresponding with each treatment condition as the performance difference relative to the baseline control condition (i.e., no transparency (blind) condition), in which neither the chefs nor the customers could observe each other. Food satisfaction and perceived value are modeled with robust standard errors, clustered by meal and day; chef throughput time and consistency are modeled with robust standard errors, clustered by item, meal, and day. Due to the limited number of clusters in our analyses of these experimental data, we also present significance levels from the Wild Cluster Bootstrap estimation procedure in our results tables (Cameron et al., 2008). We note that the results are substantively similar under this alternative estimation technique.

$$Y = f(\alpha_0 + \alpha_1 CUST\_TRANS\_ONLY + \alpha_2 PROCESS\_TRANS\_ONLY + \alpha_3 BOTH\_ONLY + \alpha_4 X + \epsilon) \quad (1)$$

	(1) Food satisfaction	(2) Food satisfaction	(3) Food satisfaction	(4) Food satisfaction	(5) Food satisfaction
1. Customer transparency	0.577** (0.225)	0.598** (0.192)+	0.602** (0.190)+	0.659 (0.438)	0.651* (0.314)
2. Process transparency	0.293 (0.208)	0.347 (0.217)	0.358 (0.226)	0.391 (0.355)	0.223 (0.270)
3. Customer + process transparency	0.918*** (0.238)+++	0.940*** (0.216)+++	0.996*** (0.211)+++	0.998*** (0.215)+++	1.003*** (0.126)+++
4. Dinner indicator		-0.177 (0.124)	0.0158 (0.118)	-0.0120 (0.193)	0.149 (0.139)
5. Employees scheduled			0.231 (0.145)	0.199 (0.266)	0.440** (0.166)
6. Grill order volume (per shift)				-0.000430 (0.00235)	0.00000858 (0.00172)
7. Age					-0.00975 (0.0262)
8. Female indicator					0.367* (0.168)+
Constant	4.573*** (0.197)+++	4.638*** (0.227)+++	3.266*** (0.795)++	3.554* (1.919)	2.113 (1.453)
Observations	295	295	295	295	254
Adjusted R-squared	0.056	0.057	0.055	0.052	0.066
Pred. difference relative to baseline (Process trans.)	12.61%	13.13%	13.29%	14.61%	14.41%
Pred. difference relative to baseline (Customer + process trans.)	20.06%	20.64%	21.98%	22.13%	22.19%

Table 3: Models of food satisfaction survey responses (Experiment 1)

***, ** and * denote significance at the 1%, 5%, and 10% levels, respectively (two-tailed tests). +++, ++, and + denote significance with Wild Cluster Bootstrapped p-values (Cameron et al., 2008). Parentheses contain robust standard errors, clustered by meal and day. Predicted differences represent percentage increase over baseline condition. Although we use OLS in our primary analysis to facilitate coefficient interpretation, we note that all reported results are substantively similar when food satisfaction is estimated with an ordinal logistic model.

Effects of transparency on employees. In Table (3), Column (1), we compare the mean food satisfaction – our operationalization of food quality – produced under each experimental condition. The combination of customer and process transparency, in which both chefs and customers could observe each other, led to the largest gains in food satisfaction, ($\alpha_3 = 0.918$, $p < 0.01$). Although allowing the customers to see the chefs (process transparency) did not significantly increase customer food satisfaction on its own, ($\alpha_2 = 0.293$, $p = NS$), chefs who saw the customers (customer transparency) produced food that again led to significantly higher food satisfaction, even when customers could not see the chefs ($\alpha_1 = 0.577$, $p < 0.05$). Column (5) shows that these results remain robust in the fully-specified model, which includes controls for meal, number of employees scheduled, grill order volume, customer age, and customer gender.

In the fully-specified model, food satisfaction was 14.4% higher than the baseline with process transparency and 22.2% above the baseline with both customer and process transparency.

Do these quality gains come at the expense of efficiency? In Table (4), we test the effects of operational transparency on the throughput time of food production. Column (1) shows that relative to the baseline condition, average throughput time for orders was not significantly affected by the different transparency treatments, with items being prepared 17.2% slower than the baseline under customer transparency ($\alpha_1 = 10.73$, $p = NS$), 4.9% faster than the baseline under process transparency ($\alpha_2 = -3.03$, $p = NS$), and 12.2% faster than the baseline with both customer and process transparency ($\alpha_3 = -7.59$, $p = NS$). The fully-specified model in Column (4) reveals that employees worked faster during high-demand periods when more employees were scheduled ($\alpha_8 = -20.19, p < 0.01$), and slower during the final 30 minutes of the shift ($\alpha_{12} = 7.47, p < 0.05$). Controlling for these factors, allowing chefs and customers to observe each other actually reduced throughput times by 19.2% ($\alpha_3 = -12.75, p < 0.10$).

These results suggest that the quality improvements brought about by operational transparency need not jeopardize the responsiveness of the operating system.[10] In fact, under simultaneous customer and process transparency, when quality ratings are at their highest, we find that responsiveness even improved. In this condition, employees were observed being more conscientious about processing orders when they arrived and were less likely to overcook items than in the baseline.

It is interesting to note that although customer transparency improved food quality ratings, contrary to Grant et al., 2007, it did not reduce throughput times. One potential explanation for this outcome is the asymmetry of information between customers and chefs in this field experiment. Although signage accompanied the iPads noting the video conferencing software for both customers and chefs, chefs were observed to be aware of when they were (and were not) "on camera," while customers tended to lack such an awareness. Non-chef employees, who regularly entered and exited the kitchen in the course of their work responsibilities, relayed camera information to the chefs. The close proximity of the signage to the chefs' work stations, as well as the constant presence of a research assistant who would willingly provide the status of the cameras, further drove this asymmetry. Hence, it is possible that customer transparency in isolation may have served as a source of distraction in this experiment, as chefs were knowingly observing customers who were not explicitly aware they were being watched. Even with this design, customer transparency did not lead to throughput time performance that was statistically different from that of the baseline; however, we re-examine the link between customer transparency and employee effort in

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[10] In a separate analysis reported in the Online Appendix, we further find that the consistency of chef performance was not affected by the various transparency treatments (**Appendix Table 1**).

Experiment 4, which suggests that customer transparency on its own may still serve to improve employee effort.

	(1) Throughput time	(2) Throughput time	(3) Throughput time	(4) Throughput time
1. Customer transparency	10.73 (6.650)	9.988 (6.064)	9.998 (6.180)	1.061 (7.657)
2. Process transparency	-3.029 (6.214)	-2.990 (5.737)	-2.896 (5.808)	-4.397 (5.060)
3. Customer + process transparency	-7.586 (6.563)	-14.89** (6.900)+	-14.88** (6.990)+	-12.75* (7.150)+
4. Eggs indicator	86.16*** (7.932)	87.09*** (6.763)	86.21*** -6.697	86.39*** (6.786)
5. Egg whites indicator	19.18*** (6.158)	20.88*** (5.599)	20.33*** (5.608)	20.21*** (5.668)
6. Scrambled indicator	17.43*** (6.152)	19.91*** (5.512)	19.53*** (5.541)	19.69*** (5.668)
7. Dinner indicator	15.33*** (4.936)	-3.979 (4.915)	-4.994 (4.802)	-6.395 (5.475)
8. Employees scheduled		-24.15*** (5.219)+++	-24.39*** (5.286)+++	-20.19*** (7.282)++
9. Time frame 2 indicator			-0.0761 (2.903)	-0.189 (2.834)
10. Time frame 3 indicator			1.376 (2.785)	1.209 (2.800)
11. Time frame 4 indicator			2.324 (3.348)	2.534 (3.328)
12. Time frame 5 indicator			7.424** (3.250)++	7.470** (3.241)++
13. Grill order volume				-0.494 (0.403)
14. Grill order volume^2				0.001 (0.001)
Constant	18.31*** (6.466)+++	159.8*** (31.97)+++	160.0*** (33.06)+++	198.3*** (66.92)++
Observations	473	473	473	473
Adjusted R-squared	0.667	0.690	0.692	0.695
Pred. Effect (Baseline)	62.26	65.26	65.24	66.47
Pred. Effect (Customer transparency)	72.99	75.25	75.24	67.53
Pred. Effect (Process transparency)	59.23	62.27	62.35	62.07
Pred. Effect (Customer + process transparency)	54.67	50.37	50.37	53.72

Table 4: Models of throughput time (Experiment 1)

***, ** and * denote significance at the 1%, 5%, and 10% levels, respectively (two-tailed tests). +++, ++, and + denote significance with Wild Cluster Bootstrapped p-values (Cameron et al., 2008). Parentheses contain robust standard errors, clustered by item, meal, and day. Predicted effects are shown in seconds and may be interpreted as the average throughput time in a particular condition, after controlling for the factors in each model.

Effects of transparency on customers. Consistent with the food satisfaction results, Table (5), Column (1) shows that when customers and chefs could observe one another, customers perceived the service to be more valuable ($\alpha_3 = 0.754, p < 0.01$) than when they could not. Relative to the baseline, perceived value was unchanged when only one side could see the other, both when chefs could observe customers who

could not see them ($\alpha_1 = 0.263, p = NS$), and when customers could observe chefs who could not see them ($\alpha_2 = -0.012, p = NS$). In the fully specified model (Column 5), relative to the baseline control, customers perceive the service to be 18.51% more valuable under both types of transparency ($\alpha_3 = 0.818, p < 0.01$). Interestingly, Columns (6-7) demonstrate that these differences in perceived value may not be fully explained by the differences in food quality. In the fully specified model, 41.81% of the improved value perception persists ($\alpha_3 = 0.342, p < 0.01$) after controlling for food satisfaction, which is itself a highly significant predictor of perceived value ($\alpha_4 = 0.496, p < 0.01$).

	(1) Perceived value	(2) Perceived value	(3) Perceived value	(4) Perceived value	(5) Perceived value	(6) Perceived value	(7) Perceived value
1. Customer transparency	0.263 (0.212)	0.269 (0.198)	0.271 (0.195)	0.294 (0.429)	0.283 (0.447)	-0.0216 (0.227)	-0.0315 (0.285)
2. Process transparency	-0.0120 (0.239)	0.00338 (0.253)	0.00697 (0.258)	0.0204 (0.383)	-0.0286 (0.401)	-0.159 (0.211)	-0.128 (0.261)
3. Customer + process transparency	0.754*** (0.163)+++	0.760*** (0.158)+++	0.777*** (0.162)+++	0.778*** (0.167)++	0.818*** (0.139)+++	0.304*** (0.0570)+++	0.342*** (0.0704)+++
4. Food satisfaction						0.497*** (0.0299)+++	0.496*** (0.0402)+++
5. Dinner indicator		-0.0503 (0.120)	0.00748 (0.0801)	-0.00410 (0.194)	0.198 (0.211)	0.0146 (0.116)	0.133 (0.161)
6. Employees scheduled			0.0696 (0.120)	0.0562 (0.217)	0.253 (0.182)	-0.0366 (0.0974)	0.0387 (0.124)
7. Grill order volume (per shift)				-0.000178 (0.00244)	0.000262 (0.00254)	0.000106 (0.00139)	0.000345 (0.00170)
8. Age					0.00504 (0.0186)		0.00665 (0.0129)
9. Female indicator					0.224* (0.115)++		0.0267 (0.0804)
Constant	4.440*** (0.147)+++	4.458*** (0.173)+++	4.045*** (0.659)+++	4.164** (1.692)	2.682 (1.616)	2.323** (0.809)	1.638 (1.024)
Observations	299	299	299	299	258	295	254
Adjusted R-squared	0.082	0.079	0.076	0.073	0.083	0.465	0.478
Pred. difference rel. to baseline (Customer + process transp.)	16.98%	17.15%	17.56%	17.61%	18.51%	6.49%	7.33%

Table 5: Models of customer perceived value (Experiment 1)

***, ** and * denote significance at the 1%, 5% and 10% levels, respectively (two-tailed tests). +++, ++, and + denote significance with Wild Cluster Bootstrapped p-values (Cameron et al., 2008). Parentheses contain robust standard errors, clustered by meal and day.

These findings are consistent with the notions that 1) customer perceptions of service value may improve when customers and employees can see one another during the service delivery process and 2) both objective and perceptual factors distinctly contribute to the gains engendered by transparency, which we next corroborate in an additional field experiment. It is interesting to note that process transparency on its own did not significantly increase customer perceptions of value in Experiment 1. Buell and Norton

(2011) found that revealing the work performed in an automated context increased customer perceived value. One explanation for this discrepancy is that customers, who were unaware that chefs could not see them in the process transparency condition, may have perceived the service as less valuable due to the lack of employee responsiveness. For instance, if a customer waved to a chef in the process transparency condition, the chef would not see the customer and would not wave back. Experiment 2 explores the effect of process transparency on customer value perceptions in face-to-face service settings through a design that eliminates this information asymmetry.

The contributions of Experiment 2 are distinct from Buell and Norton (2011) for two reasons. First, service environments in face-to-face settings are much more heterogeneous and face more disruption than in online settings, suggesting that empirical tests are necessary to explore how transparency functions and affects customers and employees in different contexts. Second, the test of process transparency in Experiment 2 examines whether the process observed by customers needs to be directly linked to the individual outcome received in order for the benefits of process transparency to accrue.

3.2 Experiment 2: The effect of process transparency on customer value perceptions

Experiment 1 demonstrated that operational transparency that allows customers and employees to see one another can improve both objective performance and perceived service value. In order to further examine whether the perceived and objective differences in performance evaluations were distinct effects, and to directly test the effect of process transparency on value perceptions, we conducted a second field experiment in a separate dining hall that serves a non-overlapping group of customers drawn from a broader population. The dining hall used for Experiment 2 was located in the same university in the Northeastern United States.

Participants. 48 participants (45.8% female; $M_{age} = 32.08$, $SD = 10.11$) responded to recruiting advertisements attached to all made-to-order sandwiches prepared by the dining hall's sandwich station. As such, the experiment targeted customers who had purchased a sandwich during the day of recruitment. The advertisement invited customers to access an online link to enroll in the experiment that afternoon, in exchange for a free, custom-made sandwich the following day.

Design and procedure. Upon enrollment, participants rated their satisfaction with the sandwich they ordered and their perceptions of the value of the sandwich station (Sweeney and Soutar, 2001) ($\alpha = 0.86$), using the same measures as Experiment 1. They also placed an order for the sandwich they would receive for lunch during the following day. The online order form replicated all options available for made-to-order sandwiches. Importantly, during the time of the experiment, this dining hall was in the midst of introducing a process to allow customers to pre-order sandwiches, but the offering had not yet gained popularity. Our experiment thus represented the first time this sample of customers received pre-ordered sandwiches from

this facility. The made-to-order sandwich experience, which we use to establish baseline satisfaction and value perception measures for each participant, is therefore a relevant comparison.
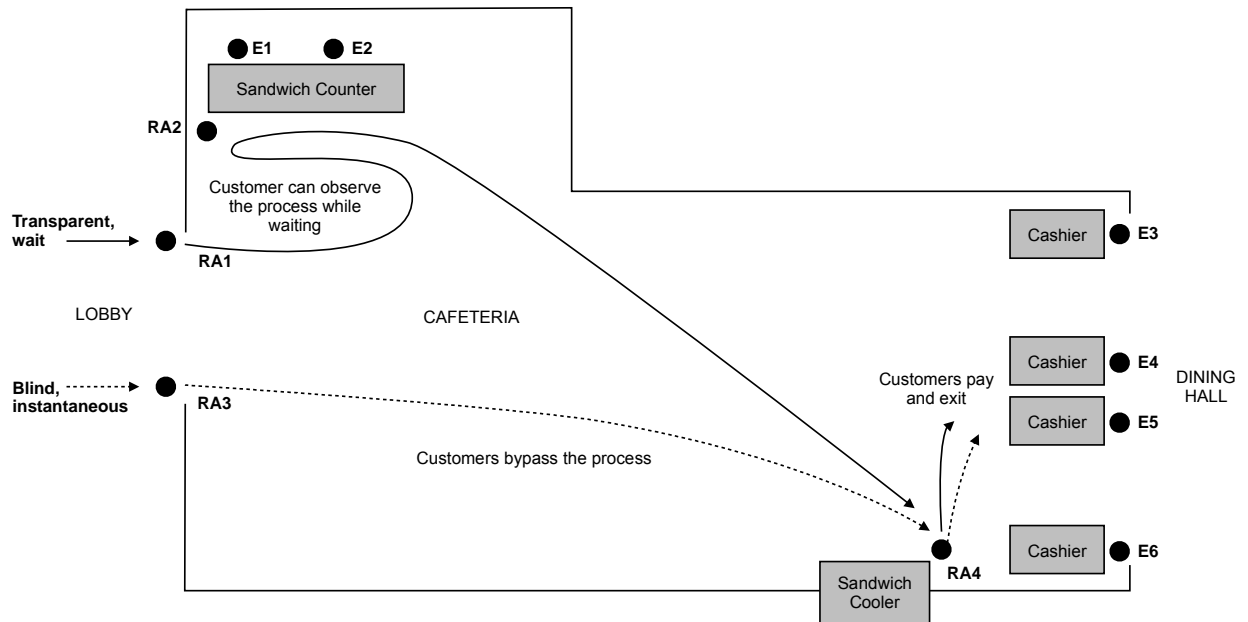

Figure 3: Layout of the dining hall and customer flow during field experiment (Experiment 2)

Participants were randomly assigned to one of two conditions, and upon pre-ordering their sandwich, were given instructions to bring their participant ID number and meet a research assistant wearing a red or yellow t-shirt, that corresponded to their condition. The colors of research assistant t-shirts and the roles played by each research assistant were counterbalanced across conditions over the multiple days during which this experiment was run. Participants in the *no transparency condition* (blind condition) met a research assistant at the door to the cafeteria who escorted them directly to a cooler to pick up the sandwich they had pre-ordered, which had been made to their specifications before their arrival and indexed by participant ID number. Those in the *process transparency condition* (transparent condition) met a research assistant who escorted them to the sandwich station queue, where they waited in view of the sandwich-making process. When the participant reached the front of the queue, and before the participant interacted with the chef, a second research assistant met the participant and escorted them to the same cooler described above to pick up their pre-made sandwich. At the conclusion of the lunch period, which lasted from 11:30 am - 2:00 pm, participants in both conditions were emailed a link to a second survey that asked them to

evaluate their satisfaction with the food and their perceptions of the value of the sandwich station (Sweeney and Soutar, 2001) ($\alpha = 0.88$), using the same measures as above.[11]

		No Transparency			Process Transparency			All	
	n	Mean	Std. Dev.	n	Mean	Std. Dev.	n	Mean	Std. Dev.
Perceived value	23	5.85	1.18	25	5.79	1.08	48	5.82	1.12
Initial perceived value	23	6.12	1.13	25	5.52	1.08	48	5.81	1.13
Perceived value difference	23	-0.27	0.53	25	0.27	0.70	48	0.01	0.68
Food satisfaction	23	5.57	1.31	24	5.54	1.72	47	5.55	1.52
Initial food satisfaction	23	6.26	1.01	25	6.20	0.87	48	6.23	0.93
Food satisfaction difference	23	-0.70	1.61	24	-0.63	1.86	47	-0.66	1.72
Sandwich complexity	23	6.61	1.27	25	6.68	1.25	48	6.65	1.25
Perceived wait (minutes)	23	0.72	1.20	25	3.16	4.37	48	1.99	3.46
Time allotted (minutes)	23	29.70	19.74	25	34.16	18.52	48	32.02	19.05
Age	23	32.96	11.17	25	31.28	9.17	48	32.08	10.11
Female pct.	23	47.8%	0.67	25	44.0%	0.58	48	45.8%	0.62
Education									
High school pct.	23	4.3%	0.21	25	0.0%	0.00	48	2.1%	0.14
Some college pct.	23	4.3%	0.21	25	4.0%	0.20	48	4.2%	0.20
4-year college degree pct.	23	47.8%	0.51	25	60.0%	0.50	48	54.2%	0.50
Masters degree pct.	23	39.1%	0.50	25	28.0%	0.46	48	33.3%	0.48
Doctorate or professional degree pct.	23	4.3%	0.21	25	8.0%	0.28	48	6.3%	0.24
Ethnicity									
Asian pct.	23	13.0%	0.34	25	20.0%	0.41	48	16.7%	0.38
Caucasin pct.	23	78.3%	0.42	25	60.0%	0.50	48	68.8%	0.47
Hispanic pct.	23	0.0%	0.00	25	4.0%	0.20	48	2.1%	0.14
Other pct.	23	8.7%	0.29	25	16.0%	0.37	48	12.5%	0.33

Table 6: Summary statistics (Experiment 2)

Dependent measures. Perceived value and food satisfaction responses were differenced against the initial day's responses to create normalized metrics for each participant. Positive differences represent an increase in the measures, whereas negative values represent a decrease. Perceived value in the no transparency condition fell from an average of ($M = 6.12, SD = 1.13$) to an average of ($M = 5.85, SD = 1.18$), a decrease of ($M = -0.27, SD = 0.53$). In contrast, perceived value in the process transparency condition increased from an average of ($M = 5.52, SD = 1.08$) to an average of ($M = 5.79, SD = 1.08$), an increase of ($M = 0.27, SD = 0.70$). However, food satisfaction fell in both conditions, from an average of ($M = 6.26, SD = 1.01$) to an average of ($M = 5.57, SD = 1.31$) in the blind condition, a decrease of ($M = -0.70, SD = 1.61$), and from an average of ($M = 6.20, SD = 0.87$) to an average of ($M = 5.54, SD = 1.72$) in the transparent condition, a difference of ($M = -0.63, SD = 1.86$). Because of the differences in initial value perceptions among customers randomly assigned to the treatment and control conditions, we introduce controls for initial value perceptions and initial food satisfaction in our models, where appropriate.

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[11] We note that email addresses were stored separately from survey responses and were deleted at the conclusion of the study, to protect the anonymity of participant responses.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Perceived value change	Perceived value change	Perceived value change	Perceived value change	Perceived value change	Perceived value change	Perceived value change	Food satisfaction change
1. Process transparency	0.545*** (0.178)	0.465*** (0.162)	0.527*** (0.171)	0.531*** (0.177)	0.521*** (0.184)	0.493** (0.187)	0.448** (0.177)	-0.161 (0.545)
2. Initial perceived value		-0.133* (0.0676)	-0.121* (0.0681)	-0.123* (0.0701)	-0.115 (0.0747)	-0.0812 (0.0764)	-0.162** (0.0756)	
3. Perceived wait			-0.0220 (0.0249)	-0.0222 (0.0253)	-0.0187 (0.0222)	0.000348 (0.0289)	0.0125 (0.0286)	0.155** (0.0633)
4. Time allotted for lunch				-0.00117 (0.00499)	-0.00172 (0.00487)	-0.00222 (0.00579)	-0.00335 (0.00588)	-0.0275* (0.0157)
5. Complexity					0.124* (0.0658)	0.194** (0.0796)	0.167** (0.0785)	-0.0101 (0.221)
6. Age						-0.0101 (0.0107)	-0.0111 (0.0116)	-0.0189 (0.0344)
7. Female indicator						0.349** (0.152)	0.339** (0.138)	0.436 (0.409)
8. Food satisfaction change							-0.0177 (0.0527)	
9. Initial food satisfaction							0.235* (0.121)	-0.804*** (0.234)
Constant	-0.272** (0.110)	0.545 (0.412)	0.482 (0.419)	0.530 (0.488)	-0.321 (0.719)	-0.816 (0.945)	-1.936* (1.068)	3.490 (3.196)
Education controls	No	No	No	No	No	Yes	Yes	Yes
Ethnicity controls	No	No	No	No	No	Yes	Yes	Yes
Observations	48	48	48	48	48	48	47	47
Adjusted R-squared	0.148	0.177	0.170	0.152	0.189	0.297	0.382	0.227

Table 7: Models of perceived value and food satisfaction changes (Experiment 2)

***, ** and * denote significance at the 1%, 5%, and 10% levels, respectively (two-tailed tests). Parentheses contain robust standard errors. One participant did not complete the food satisfaction question on the second survey, resulting in the smaller sample size in Columns (6-7).

Control variables. We control for several experiential and demographic factors that may have affected perceived value and food satisfaction (**Table 7**). In addition to the dependent measures, participants were asked about their perceptions of the length of time they waited for their sandwich. As anticipated, participants in the transparent condition, who waited in the queue in view of the sandwich-making process, perceived their waits to be longer ($M = 3.16$ minutes, $SD = 4.37$ minutes) than participants in the control condition ($M = 0.72$ minutes, $SD = 1.20$ minutes). We also controlled for the time (in minutes) each customer reported allocating for lunch and the complexity of their order, measured as the number of toppings they requested on their pre-made sandwich. To control for the possibility that participants in the transparent condition may have been more likely to infer that their sandwiches were freshly made, we controlled for subjects' perceptions of the freshness of the sandwich. Perceptions of freshness were not significantly different between the transparent ($M = 5.16, SD = 1.72$) and blind conditions (

$M = 5.48, SD = 1.31; t(46) = 0.71, p = NS$). We also introduced a vector of demographic controls, including age, gender, ethnicity, and education.

Analysis and results. We model changes in perceived value and food satisfaction, Y, as a linear function of whether the customer was randomly assigned to the process transparency condition, *PROCESS_TRANS*; the initial period value perceptions and satisfaction, *INITIAL*; and a series of experiential (*WAIT, ALLOTTED, COMPLEXITY, FRESHNESS*) and demographic controls.

$$Y = f \begin{pmatrix} \gamma_0 + \gamma_1 PROCESS\_TRANS + \gamma_2 INITIAL + \gamma_3 WAIT + \\ \gamma_4 ALLOTTED + \gamma_5 COMPLEXITY + \gamma_6 FRESHNESS + \gamma_7 X + \epsilon \end{pmatrix} \tag{2}$$

Consistent with Experiment 1, Table (7) Column (1) shows that relative to their initial perceptions, participants in the transparent condition, who were able to observe the sandwich-making process, perceived the service to be more valuable on average than participants who were not able to observe the process ($\gamma_1 = 0.545, p < 0.01$). This is somewhat surprising, given that participants in the transparent condition were not observing their own sandwiches being prepared. It is also counterintuitive as participants in the transparent condition reported waiting for their sandwich more than four times longer on average than participants in the blind condition. Columns (2-6) demonstrate that this effect is robust to controls for initial value perceptions, perceived waiting time, time allotted for lunch, complexity of the sandwich order, perceived freshness, and demographic controls ($\gamma_1 = 0.510, p < 0.05$). As seen in Experiment 1, Column (7) shows that the increase in perceived value engendered by transparency is robust to controlling for the customer's satisfaction with the food they received ($\gamma_1 = 0.478, p < 0.05$). However, since the sandwiches in this study were pre-made, transparency could not have influenced the behavior of the chefs, and therefore did not result in any improvement in objective service quality ($\gamma_1 = 0.252, p = NS$). This pattern of results offers converging evidence that perceived and objective performance may be separately influenced by the introduction of operational transparency.

Experiments 1 and 2 provided field evidence that introducing operational transparency can generate positive outcomes for both consumers and employees. What factors might have led to these improvements? Motivated both by prior research and our field observations, we hypothesize that customers who observe employees at work, relative to those who never see the employees, should perceive greater effort and experience deeper feelings of appreciation. Similarly, for chefs, we hypothesize that those who observe the beneficiaries of their work may feel more appreciated, and in turn, become more satisfied and willing to exert more effort. In fact, when we debriefed the kitchen staff at the conclusion of Experiment 1, one chef volunteered the following explanation: "When [the customers] can see the work we're doing for them, they

appreciate it, and I appreciate that. It makes me want to improve." Experiments 3 and 4 turned to laboratory experiments to test these two hypotheses.

3.3 Experiment 3: Mechanisms underlying the effects of process transparency on customers

In Experiment 3, we test whether perceived effort and appreciation serve as an underlying mechanism for the effects of process transparency on customers. This customer-side theoretical account is consistent with prior research conducted in other service settings (Buell and Norton, 2011), but has not yet been empirically tested in face-to-face settings. We further unpack the mechanism by exploring whether it is indeed process transparency, as differentiated from simply employee transparency – that is, any visual access to the employees themselves – that drives the pattern of effects we observe.

Participants. 269 participants (62.5% male; $M_{age} = 31.48$, $SD = 10.11$) completed this experiment on the Amazon Mechanical Turk platform in exchange for 50 cents (Buhrmester et al., 2011; Mason and Suri, 2012). Participants were asked to assume the role of a customer as they watched a video of a service interaction that took place at a cafeteria sandwich counter. For analysis, we retained data from the 254 participants who watched at least the first minute of the assigned video, which was approximately two minutes (61.4% male; $M_{age} = 31.80$, $SD = 10.24$), as participants who watched for less than one minute failed to fully observe the experimental manipulation.[12]

Design and procedure. Participants were randomly assigned to watch one of three videos portraying a service interaction at a cafeteria sandwich counter, viewed from the customer's perspective. All videos were filmed using a head-mounted camera worn by an actual customer. Thus, participants could vicariously experience what the customer in the video was experiencing. Each video represented a service design employing a different level of visual access to the chef and process: 1) the customer handed the order to a non-chef employee, who relayed it to the chef, who made the sandwich out of the customer's view (customer observes neither the chef nor the process), 2) the customer handed the order directly to the chef, who made the sandwich out of the customer's view (customer observes chef only outside the process), or 3) the customer handed the order to the chef, who made the sandwich in full view of the customer (customer observes chef throughout or in the process) (**Figure 4A**). This final condition most closely mirrors the simultaneous customer and process transparency condition experienced in the field by customers in Experiment 1, as well as the process transparency conditions customers experienced in Experiments 1 and 2. To ensure equivalent outcome quality across conditions, all participants were shown the same image of

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[12] We defined this exclusion criterion prior to collecting data to ensure that participants observed the experimental manipulation. For instance, a participant who only watched the first 30 seconds of the video would not have seen any of the sandwich creation process. 94% of all participants watched at least the first minute of the video, and 71% watched the entire video. We note our results are substantively similar if we limit our analysis to the participants who watched the entire video (n=192).

a sandwich, pickle, and bag of chips as the outcome of the service, before being directed to a series of questions about their experience.

Dependent measures. Along with the perceived value scale ($\alpha = 0.94$) (Sweeney and Soutar, 2001), we measured perceived effort using an adapted four-item scale: "How much effort do you think the chef put in?", "How much expertise do you think the chef has?", "How much experience do you think the chef has?", and "How thorough was the chef in delivering your food?" ($\alpha = 0.91$) (Buell and Norton, 2011). We also measured feelings of appreciation using an adapted 3-item scale: "How positively do you feel toward the chef?", "How appreciative do you feel toward the chef?", and "How grateful do you feel toward the chef?" ($\alpha = 0.95$) (Bartlett and DeSteno, 2006). We conducted a confirmatory factor analysis, which led us to drop the thoroughness item from the effort scale, as it loaded more strongly on the appreciation factor ($RC_{app} = 0.702$) than the effort factor ($RC_{eft} = 0.379$). Despite dropping the thoroughness item, the three-item effort scale retained strong internal reliability ($\alpha = 0.91$).

| | Non-chef employee facilitates interaction between customer and chef | Customer and chef observe each other outside of the process | Customer and chef observe each other throughout the process |

A. Customer perspective (Experiment 3)

B. Employee perspective (Experiment 4)

Figure 4: Visual depictions of experimental conditions (Experiments 3-4).

Analysis and results. A univariate ANOVA suggests that there was a significant difference in perceived value across conditions, $F(2,253) = 13.89$, $P < 0.01$. More specifically, participants who observed the chef throughout the process reported higher perceived value ($M = 5.68$, $SD = 0.99$) than those who observed the chef outside the process ($M = 4.79$, $SD = 1.51$), $t(173) = 4.59$, $P < 0.01$; and those who observed neither the chef nor the process ($M = 4.77$, $SD = 1.36$), $t(168) = 5.02$, $P < 0.01$. There was no significant

difference between participants in the two latter conditions, $t(161) = 0.11$, $P = NS$. Perceived effort and appreciation measures followed a similar pattern, with significant differences across conditions, $F(2,253) = 9.99$, $P < 0.01$; and $F(2,253) = 17.51$, $P < 0.01$, respectively. Participants observing the chef throughout the process perceived more effort ($M = 4.95$, $SD = 1.24$) and appreciated the provider more ($M = 5.64$, $SD = 1.12$) than participants who observed the chef outside the process ($M = 4.34$, $SD = 1.22$; $t(173) = 3.25$; $P < 0.01$), ($M = 4.62$, $SD = 1.39$; $t(173) = 5.38$, $P < 0.01$), and participants who saw neither the chef nor the process ($M = 4.14$, $SD = 1.26$; $t(168) = 4.21$, $P < 0.01$), ($M = 4.62$, $SD = 1.47$; $t(168) = 5.18$, $P < 0.01$), respectively. Similar to perceived value, there were no significant differences in perceived effort and appreciation between participants who observed the chef outside the process and those who observed neither the chef nor the process, $t(161) = 1.06$, $P = NS$; and $t(161) = 0.03$, $P = NS$, respectively. Consistent with the results in Experiments 1 and 2, when employees engaged in labor are revealed to customers through process transparency, rather than only employee transparency or no transparency at all, those customers perceive the service to be more valuable.
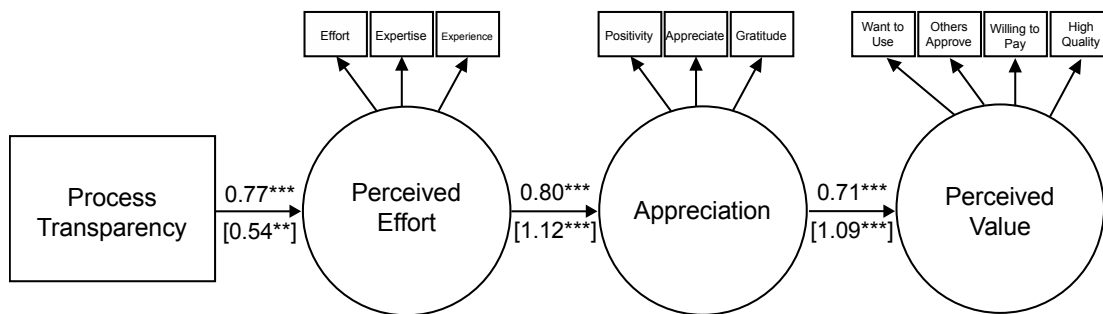

Figure 5: Process transparency path analysis (Experiment 3)

Standardized beta coefficients displayed for Experiment 3. Coefficients for a replication of Experiment 3, conducted in isolated areas of rural Kenya, are presented in brackets (See Online Appendix for details). Seeing the employee throughout the process is compared with the baseline condition, during which customers and employees could not observe one another. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

To test the theory that process transparency increases perceptions of effort, which cause the customer to feel more appreciative of the employee and thus perceive the service as more valuable, we used structural equation modeling to conduct a path analysis using the perceived effort, appreciation, and perceived value measures. Given that our results suggest that observing the chef throughout the process (process transparency) is what triggers improved perceptions among customers, we modeled that condition against the baseline condition, during which the customer and chef could not see one another. As noted (**Figure 5 -- coefficients without brackets**), observing the chef throughout the process is positively associated with perceived effort (standardized regression coefficient $\beta = 0.77$, $P < 0.01$), which in turn is positively

associated with appreciation (standardized regression coefficient $\beta = 0.80$, $P < 0.01$), which has a positive association with perceived value (standardized regression coefficient $\beta = 0.71$, $P < 0.01$).[13] The model exhibits a strong fit, with a high Comparative Fit Index ($CFI = 0.925$), and a low Root Mean Squared Error of Approximation ($RMSEA = 0.141$, $P < 0.01$). These results are consistent with the theory that process transparency increases the degree to which customers perceive employee effort, which in turn increases their appreciation of the employee, leading to increased perceived value of the service.

3.4 Experiment 4: Mechanisms underlying the effects of customer transparency on employees

The results from Experiment 3 demonstrate one mechanism underlying the effects of process transparency on customer perceptions of service, but what accounts for the objective improvement in employee service performance engendered by customer transparency? We test three possible mechanisms: perceptions of customers' appreciation, perceptions of the work's impact, and perceptions of monitoring. First, we tested whether appreciation and effort would mirror the link that we identified for customers: whether employees would feel more appreciated after seeing customers and thus be more willing to exert greater effort. If so, this could help account for the finding in Experiment 1, in which chefs made higher quality food when they could see their customers. A second explanation for this pattern of effects is that seeing the beneficiaries of one's efforts may make the work feel more impactful. Theory suggests that the relational architecture of a job increases the motivation to make a prosocial difference by more directly connecting employees to the impact they are having on the beneficiaries of their work (Grant, 2007) and prior research has shown that even asynchronous contact with beneficiaries bolsters motivation and persistence (Grant et al., 2007). We sought to test whether the same pattern of results exist in synchronous settings, when the customer is present while the work is being performed. Third, through the design of the experiment, we further sought to disentangle the effect of operational transparency on effort from any effects of monitoring. To the extent that a customer could be perceived as an on-site manager when they are able to observe employees, customer transparency may prompt the feeling of being monitored, which may then intensify employee effort. Mirroring our earlier experiments, we utilize two customer transparency treatments, which allow us to separately evaluate the effects of transparency when the customer can and cannot observe the employee's efforts.

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[13] Given the prevalence of open kitchens in Western society, one possibility is that customers in the United States have become socialized to perceive open kitchens more favorably. We replicated Experiment 3 by recruiting participants from isolated, rural areas in Kenya in order to test the extent to which the patterns we observed in the United States may generalize across cultures. As described in the Online Appendix, the pattern of results and the causal mechanism were substantively similar to Experiment 3. Coefficients from the structural equation model are presented in Figure 5 with brackets.

Participants. We recruited 599 participants from Amazon Mechanical Turk (64.1% male; $M_{age} = 33.56$, $SD = 11.55$) and asked them to assume the role of a chef employee while watching the video of a service interaction. All videos mirrored those described in Experiment 3, but from the chef employee's perspective. We ensured the quality of participant data by only retaining responses from those who met two pre-defined criteria: 1) viewed at least the first minute of the assigned video, which lasted approximately two minutes in total, and 2) correctly answered a free-response question about the role they were assuming in the experiment. These exclusion criteria resulted in a sample of 557 participants (63.4% male; $M_{age} = 33.74$, $SD = 11.67$), which we report for our primary analysis.[14] We also report statistics from a subset of this sample who reported prior work experiences in food service ($N = 180, 58.3\%$ male; $M_{age} = 33.01$, $SD = 10.22$), and we note that the pattern of results generalizes across samples with and without prior industry experience (**Table 7**).

Design and procedure. Mirroring Experiment 3, participants were randomly assigned to watch one of three videos portraying a service interaction at a cafeteria sandwich counter, this time viewed from the employee's perspective. All videos were captured with a head-mounted camera worn by an actual employee. Thus, participants could vicariously experience what the employee in the video was experiencing. Each video represented a service design employing a different degree of visual access to the customer, during various phases of the process: 1) a non-chef employee serves as the intermediary between the chef and the customer (chef does not observe customer), 2) the customer hands the order directly to the chef, who makes the sandwich out of the customer's view (chef observes customer outside the process), or 3) the customer hands the order to the chef, who makes the sandwich in full view of the customer (chef observes customer throughout process) (**Figure 4B**). The type of transparency represented in the third condition is concurrent with the chef's effort, providing the customer with an opportunity to observe the chef's performance.

Prior to watching the video, all participants were instructed to imagine that they worked as a chef in the deli section of a cafeteria that features various stations, and they read a short description of the operational design that corresponded with their experimental condition. The full text of each description is included in the online appendix. In order to ensure equivalent outcome quality perceptions across conditions, after reading the description and watching the video, all participants were shown the same image of a sandwich, pickle spear, and bag of chips, before being directed to answer a series of questions about how they, assuming the role of the chef, felt during the experience.

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[14] As with Experiment 3, we defined this exclusion criterion prior to collecting data to ensure participants observed the experimental manipulation. 93% of all participants watched at least the first minute of the video and correctly answered the qualifying question, and 92% watched the entire video and correctly answered the qualifying question. We note our results are substantively similar if we limit our analysis to the participants who watched the entire video (n=549).

Dependent measures. We examined participants' intended effort after watching the video, measured as the mean of the responses to the following items: "When there's a job to be done, I devote all my energy to getting it done," "When I work, I do so with intensity," "I work at my full capacity in all of my job duties," "I strive as hard as I can to be successful in my work," and "When I work, I really exert myself to the fullest" ($\alpha = 0.952$) (Brown and Leigh, 1996), as well as perceived job satisfaction: "How satisfied are you with your job in general?"

To test whether perceived appreciation explained differences in intended effort and job satisfaction, we measured the degree to which participants assuming the role of the employees felt appreciated in their work: "How much positivity do you feel from the consumer?", "How appreciated do you feel by the consumer?", and "How much gratitude do you feel from the consumer?" ($\alpha = 0.967$) (Bartlett and DeSteno, 2006).

To measure perceived impact and monitoring, we adapted items from (Hochwarter et al., 2003) and (Thoms et al., 2002). Perceived impact items included "The outcomes experienced by my customers depend on my success or failure.", "To what extent do the methods that you use to perform your job have an impact on your customers?," and "To what extent does your level of performance of your job have an impact on customers?" ($\alpha = 0.848$). Perceived monitoring items included, "I often have to explain why I do certain things at work", "Customers closely scrutinize my efforts at work", "To what extent do you have to justify the methods that you use in performing your job to your customers?," and "To what extent do you have to justify your effectiveness in performing your job to your customers?" ($\alpha = 0.866$).

Confirmatory factor analysis revealed strong factor loadings for each scale, with no excluded item factor loading exceeding $RC = 0.348$ and no included item factor loading falling below $RC = 0.699$. *Results and analysis.* A univariate ANOVA revealed significant differences in effort, $F(2,554) = 5.78$, $P < 0.01$, job satisfaction, $F(2,554) = 4.98$, $P < 0.01$, appreciation, $F(2,554) = 128.43$, $P < 0.01$, and monitoring, $F(2,554) = 80.69$, $P < 0.01$, across conditions, as well as a marginally significant difference in perceived impact of the work, $F(2,554) = 2.67, P < 0.10$.

Participants who experienced the two transparent conditions reported higher intended effort ($M = 5.66$, $SD = 1.05$) and job satisfaction ($M = 5.22$, $SD = 1.40$) than participants in the blind condition, ($M = 5.31$, $SD = 1.35$), $t(555) = 3.31$, $P < 0.01$; and ($M = 4.82$, $SD = 1.58$), $t(555) = 3.06$, $P < 0.01$, respectively. It is worth noting the differences in the patterns exhibited by customers (in Experiment 3) and employees (in the present experiment). For customers, observing the chef throughout the process enhances perceptions of value, although observing the chef outside the process does not. In contrast, participants adopting the employee's perspective are more willing to exert effort and are more satisfied with their jobs if they can see the customer in any capacity, either inside or outside the process.

	Chef observes customer throughout process		Chef observes customer outside process		Chef does not observe customer	
	All (n=180)	Food service (n=52)	All (n=185)	Food service (n=64)	All (n=192)	Food service (n=64)
Effort	5.70***	5.69*	5.61**	5.70*	5.31	5.26
Job satisfaction	5.28***	5.15	5.16**	5.34*	4.82	4.80
Perceived appreciation	5.10***	5.14***	5.08***	4.98***	3.02	3.05
Perceived impact	5.75**	5.97**	5.61	5.69	5.49	5.45
Perceived monitoring	4.34***	4.44***	2.98***	3.01**	2.60	2.53

Table 7: Effects of Transparency on Employee Effort, Job Satisfaction, Perceived Appreciation, Perceived Impact, and Perceived Monitoring (Experiment 4)

Independent-samples t-tests were conducted for each condition against the baseline control, in which the chef did not observe the customer. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

More specifically, higher intended effort was reported by participants who observed the customer outside the process ($M = 5.61$, $SD = 1.04$) and throughout the process ($M = 5.70$, $SD = 1.06$) than by participants who did not observe the customer, $t(375) = 2.37$, $P < 0.05$; and $t(370) = 3.10$, $P < 0.01$, respectively. Higher job satisfaction was also reported by participants who observed the customer outside the process ($M = 5.16$, $SD = 1.45$) and throughout the process ($M = 5.28$, $SD = 1.35$) than by participants who did not observe the customer, $t(375) = 2.18$, $P < 0.05$; and $t(370) = 3.01$, $P < 0.01$, respectively. There was not a significant difference in perceived effort or job satisfaction between the transparent conditions, $t(363) = .087$, $P = NS$; and, $t(363) = .825$, $P = NS$, respectively.

Broadly speaking, appreciation, monitoring, and impact followed similar patterns. Participants in the transparent conditions reported feeling more appreciated ($M = 5.09$, $SD = 1.24$) than participants in the blind condition ($M = 3.02$, $SD = 1.77$), $t(555) = 16.04$, $P < 0.01$. Although there was no significant difference in feelings of appreciation among customers in the transparent conditions, $t(363) = 0.173$, $P = NS$, participants who saw the customer throughout ($M = 5.10$, $SD = 1.21$) and outside the process ($M = 5.08$, $SD = 1.27$) reported feeling more appreciated than participants who did not observe the customer, $t(370) = 13.13$, $P < 0.01$; and, $t(375) = 12.90$, $P < 0.01$, respectively.

Participants in the transparent conditions also reported feeling more monitored ($M = 3.65$, $SD = 1.51$) than participants in the blind condition, ($M = 2.60$, $SD = 1.42$), $t(555) = 7.94$, $P < 0.01$. Understandably, participants who experienced transparency throughout the service delivery process felt significantly more monitored ($M = 4.34$, $SD = 1.26$) than participants who experienced transparency outside the process ($M = 2.98$, $SD = 1.42$), $t(362) = 9.58$, $P < 0.01$, who in turn, felt more monitored than participants who did not experience transparency $t(374) = 2.60$, $P < 0.01$.

Perceived impact followed a slightly different pattern. Although participants in the transparent conditions felt their work was marginally more impactful ($M = 5.49$, $SD = 1.24$) than participants in the

blind condition, ($M = 5.68$, $SD = 1.04$), $t(555) = 1.93$, $P < 0.10$, the effects were not consistent across conditions. In particular, relative to the participants who did not experience transparency, participants who were able to observe the customer throughout the process felt that their work was more impactful ($M = 5.76$, $SD = 1.00$), $t(370) = 2.27$, $P < 0.05$, whereas participants who observed the customer outside the process did not ($M = 5.61$, $SD = 1.07$), $t(375) = 0.98$, $P = NS$.

The intuition provided by the chefs in the field and our findings from Experiment 1 suggest that seeing their customers makes employees feel more appreciated, and in turn, more satisfied with their jobs and more willing to exert effort. To test this theory, as well as the roles of perceived impact and monitoring in promoting increased effort and job satisfaction, we again turned to structural equation modeling to conduct a path analysis. Our results suggest that seeing the customer causes employees to feel more appreciated (standardized regression coefficient $\beta = 2.06$, $P < 0.01$). Feeling appreciated, in turn, is separately and positively associated with willingness to exert effort (standardized regression coefficient $\beta = 0.14$, $P < 0.01$), and job satisfaction (standardized regression coefficient $\beta = 0.30$, $P < 0.01$). Seeing the customer also increases perceptions of monitoring (standardized regression coefficient $\beta = 0.97$, $P < 0.01$). However, perceived monitoring is neither predictive of effort (standardized regression coefficient $\beta = -0.01$, $P = NS$) nor job satisfaction (standardized regression coefficient $\beta = -0.03$, $P = NS$).

In our structural equation model, after accounting for the other factors, seeing the customer did not increase perceived impact (standardized regression coefficient $\beta = 0.13$, $P = NS$) across the entire participant sample. However, among participants who had prior work experience in food service, perceived impact was marginally higher when the customer was visible (standardized regression coefficient $\beta = 0.27$, $P < 0.10$). Perceived impact, in turn, was positively associated with effort (standardized regression coefficient $\beta = 0.65$, $P < 0.01$) and job satisfaction (standardized regression coefficient $\beta = 0.55$, $P < 0.01$), for both samples. The model exhibited a strong fit, with a Comparative Fit Index ($CFI = 0.969$), and a Root Mean Squared Error of Approximation ($RMSEA = 0.063, P < 0.01$).
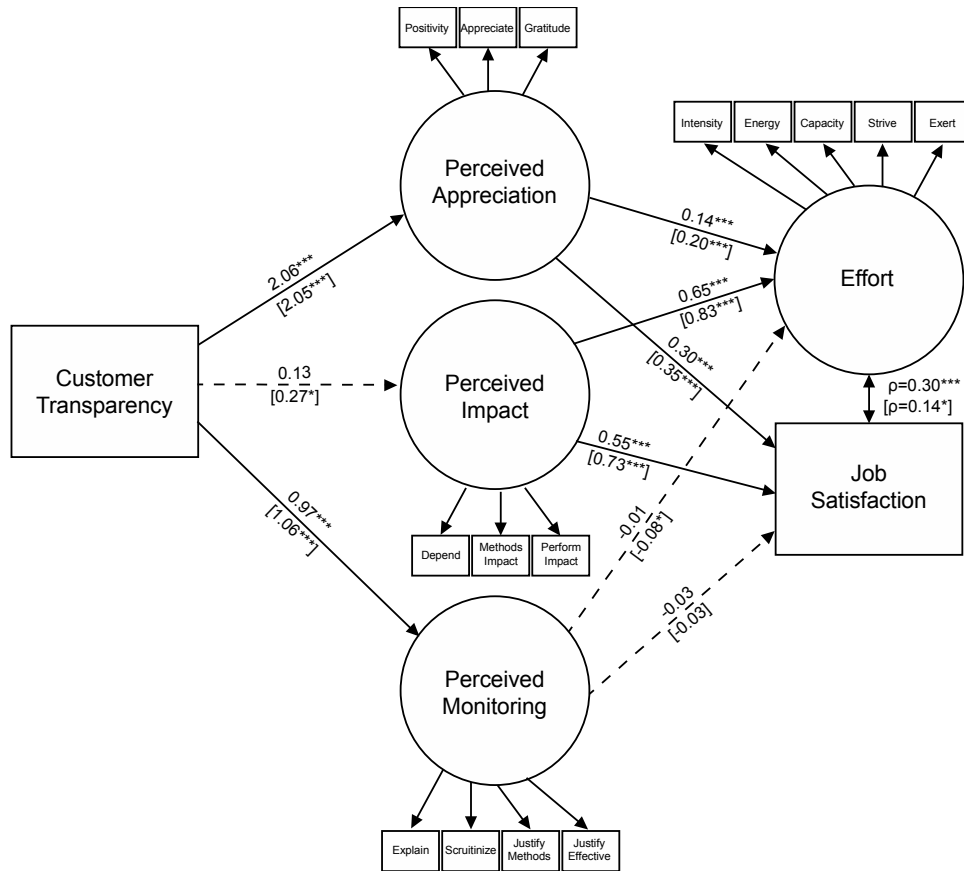
Figure 6: Employee path analysis (Experiment 4)

Standardized beta coefficients displayed for Experiment 4. Coefficients for all participants shown without brackets. Coefficients for participants with food service backgrounds shown in brackets. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. Job satisfaction and effort are significantly correlated.

These results suggest that customer transparency increases the degree to which employees feel appreciated and that their work is impactful, which in turn leads to higher employee satisfaction and effort. This pattern of results is consistent with the pattern of results we observed in the field, in which food quality improved when the chefs could observe their customers, even though customers could not observe the chefs. Our results suggest that although customer transparency can increase the feeling of being monitored, perceived monitoring is not related to effort or job satisfaction.

4. Discussion

From restaurants that adopt open-kitchen designs, to schools that "flip the classroom" and enable teachers and students to observe one another's efforts, to hospitals that encourage doctors to make decisions in collaboration with their patients, our results suggest that consumers may not be the sole beneficiaries of such innovations in transparency. Operational transparency that allows visual access between customers and employees essentially positions both parties as actor and observer, each with the potential to benefit

from the other, and in ways that create perceived and objective value. *Seeing the work* can cause customers to better appreciate the effort exerted by employees, increasing their perceptions of service value. *Seeing the customer* can cause employees to feel more appreciated and feel that their work is more impactful, which in turn, can increase their job satisfaction and willingness to exert effort, resulting in better performance (**Table 9**).

#	Experiment	Conditions enacted	Findings (relative to baseline)
1	**Effect of Operational Transparency on Customers and Employees** (Field)	Baseline: No transparency	N/A
		Customer Transparency: Employee views customer	Reduced throughput time; improved customer perceptions of food quality
		Process Transparency: Customer views employee in process	No effect*
		Both: Customer and process transparency	Reduced throughput time; improved customer perceptions of food quality and perceived value
2	**Effect of Process Transparency on Customer Value Perceptions** (Field)	Baseline: No transparency	N/A
		Process Transparency: Customer views employee in process	Improved perceived value
3	**Mechanisms Underlying the Effect of Process Transparency** (Laboratory)	Baseline: No transparency	N/A
		Employee Transparency: Customer views employee	No effect
		Process Transparency: Customer views employee in process	Process transparency increased perceived effort, appreciation, and in turn, perceived value
4	**Mechanisms Underlying the Effect of Customer Transparency** (Laboratory)	Baseline: No transparency	N/A
		Customer Transparency: Employee views customer out of process	Customer transparency (in or out of process) increased feelings of being appreciated and perceptions of impact, which in turn, increased customer satisfaction and intended effort
		Customer Transparency: Employee views customer in process	

Table 9: Summary of Results (Experiments 1 - 4)

*In contrast with the results in Experiments 2 and 3, process transparency in Experiment 1 was not found to increase customer perceptions of service value. We theorize this may relate to information asymmetry, wherein customers were not aware in that condition that chefs could not see them.

We note that these gains in performance can be economically meaningful. In our primary field experiment, the introduction of customer and process transparency contributed to a 22.2% increase in customer-reported quality and reduced throughput times by 19.2% in our fully specified models. To the extent that implementing transparency may be less costly and disruptive than alternative approaches for improving performance, our results therefore cast transparency as one additional lever that service managers may consider for improvements in the efficiency of their processes and the quality of outcomes they deliver. Furthermore, by introducing transparency, we suggest that companies can imbue operational processes with substantive meaning for customers and employees alike, in ways that could potentially benefit the company. Enhancing customer perceptions and appreciation for the effort expended and increasing customer perceptions of service value, all through process transparency, could promote top-line gains through improved satisfaction and loyalty. Helping employees feel more appreciated and satisfied, all through customer transparency, could reduce costs by decreasing turnover. Moreover, increasing employees' sense of accountability to the customer and employees' willingness to exert effort may reduce the need for monitoring, resulting in further cost savings.

Given the reciprocity inherent in the mechanisms underlying these effects, we acknowledge that consumer or producer-side breakdowns may inhibit gains. For example, process transparency may not

improve consumer perceptions when service processes are deemed to be unappealing, of poor quality, or incapable of keeping pace with demand. Revealing a process that delivered a dissatisfying result has been shown to reduce perceptions of service value (Buell and Norton, 2011). Furthermore, customer transparency may not increase quality and efficiency when producers are already operating at peak capacity (Kc and Terwiesch, 2009; Oliva and Sterman, 2001).

Understanding the contextual factors and boundary conditions that influence the effects of operational transparency on service outcomes remains a fruitful area for future research, particularly given the broad professional and lay interest in transparency. For example evidence suggests that consumers may inherently prefer operationally transparent designs. When we surveyed a separate nationwide set of 103 participants (57.9% female; $M_{age} = 33.54$, $SD = 11.77$) about their attitudes toward transparency, we found that a significant majority (76%) believed that their lives would be enriched by having more face-to-face interactions, $\chi^2(1, N = 103) = 27.27$, $P < 0.01$. Similarly, participants would be willing to pay more if they received their preferred level of in-person service during consumer transactions, $t(102) = 4.78$, $P < 0.01$.

However, open questions abound. For example, although the present work explores the impact of transparency without interaction, the net effect of interactive operational transparency, in which customers and employees can directly communicate with one another, has not yet been explored. On the one hand, interaction may facilitate information sharing, which could mitigate rework and improve efficiency, while promoting familiarity among customers and employees. On the other hand, interaction may be distracting and foster negative exchanges, worsening experiences and diminishing efficiency. Another open question is the persistence of these effects. Although our results were consistent throughout our period of analysis, the long-term effects of operational transparency among customers and employees remain undocumented. To the extent that process transparency reshapes customer service perceptions and customer transparency alters employees' perceptions of their work, it stands to reason that the short-term effects we document through minimal manipulations may have significant longer-term implications.

Our results suggest that by leveraging operational transparency to grant producers and consumers access to visual information, organizations have the potential to tap into a virtuous cycle that enhances both perceived and objective service performance. In a culture where speed and automaticity often trump other values, we suggest that seeing and appreciating the people who help us, and allowing them to see us in return, can lead to experiences that are objectively better and more fulfilling for everyone involved.

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Online Appendix for "Creating Reciprocal Value Through Operational Transparency"

1. Consistency of employee performance under customer and process transparency (Experiment 1)

To augment our measure of employee efficiency in Experiment 1, we assessed the consistency of employee throughput time, by calculating a normalized divergence metric for each item i produced of type t, during a particular shift s. We multiplied the normalized divergence metric by -1 to create a measure that increases in consistency:

$$CONSISTENCY_{its} = \frac{-|TPT_{its} - \overline{TPT}_{ts}|}{\sigma_{ts}}$$

Our analysis of the effects of various types of transparency on the consistency of employee performance uses the same empirical model as that described in the main body of the paper, as shown below:

$$Y = f(\alpha_0 + \alpha_1 CUST\_TRANS\_ONLY + \alpha_2 PROCESS\_TRANS\_ONLY + \alpha_3 BOTH\_ONLY + \alpha_4 X + \epsilon) \text{ (1)}$$

In Appendix Table 1, Columns (1-4), we observe that the consistency of throughput times was largely unaffected by the introduction of transparency between chefs and customers, with a modest improvement in consistency stemming from allowing chefs to see their customers in Column (5), ($\alpha_1 = 0.032$, $p < 0.10$). These results suggest that the quality improvements brought about by operational transparency need not jeopardize the responsiveness or the consistency of the operating system.

2. Generalizability of mechanisms underlying customer effects (Experiment 3)

Given the prevalence of open kitchens in Western society, one possibility is that customers in the United States have become socialized to perceive open kitchens more favorably. In Experiment 3B, we test the extent to which the patterns we have thus far observed only in participants based in the United States generalize across cultures.

Participants. 91 participants (55.1% female; $M_{age} = 33.44$, $SD = 12.98$) were recruited from isolated, rural areas in Kenya by an independent research center headed by academic institutions based in the United States and Switzerland. Participants had little to no exposure to Western media and culture.[1]

Design and procedure. A team of researchers and translators prepared versions of survey materials based on those used in Experiment 3, travelled to these remote regions, and presented the materials to

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[1] The demographic information was collected from 107 respondents, and 17 individuals were unable to fully complete the main part of the study due to lack of comprehension of survey items or issues with the survey response system.

participants through iPads. Researchers helped familiarize participants with the materials, and at times, assisted with entering responses for the participants.[2]

	(1) Consistency	(2) Consistency	(3) Consistency	(4) Consistency
1. Customer transparency	0.0334* (0.0191)	0.0323 (0.0198)	0.0294 (0.0203)	0.0235 (0.0353)
2. Process transparency	-0.0129 (0.0273)	-0.0128 (0.0276)	-0.0186 (0.0293)	-0.0207 (0.0317)
3. Customer + process transparency	0.0154 (0.0228)	0.00373 (0.0253)	0.00334 (0.0248)	0.00214 (0.0275)
4. Eggs indicator	-0.0595** (0.0277)	-0.0580* (0.0304)	-0.0423 (0.0314)	-0.0422 (0.0314)
5. Egg whites indicator	-0.0138 (0.0318)	-0.0111 (0.0337)	-0.00173 (0.0329)	-0.00193 (0.0329)
6. Scrambled indicator	-0.0473 (0.0303)	-0.0434 (0.0315)	-0.0383 (0.0303)	-0.0378 (0.0306)
7. Dinner indicator	-0.0305* (0.0177)	-0.0613 (0.0383)	-0.0391 (0.0389)	-0.0342 (0.0420)
8. Employees scheduled		-0.0386 (0.0396)	-0.0340 (0.0421)	-0.0306 (0.0466)
9. Time frame 2 indicator			0.00229 (0.0800)	0.00209 (0.0805)
10. Time frame 3 indicator			-0.0228 (0.0767)	-0.0228 (0.0768)
11. Time frame 4 indicator			-0.0950 (0.0772)	-0.0950 (0.0774)
12. Time frame 5 indicator			-0.124* (0.0731)	-0.124* (0.0732)
13. Grill order volume				0.0003 (0.0017)
14. Grill order volume^2				-0.0000 (0.0000)
Constant	-0.732*** (0.0282)	-0.505** (0.241)	-0.505* (0.270)	-0.566 (0.357)
Observations	473	473	473	473
Adjusted R-squared	-0.012	-0.014	-0.015	-0.019

Appendix Table 1: Models of consistency (Experiment 1)

***, ** and * denote significance at the 1%, 5%, and 10% levels, respectively (two-tailed tests). Parentheses contain robust standard errors, clustered by item, meal, and day. Predicted effects are shown in seconds and may be interpreted as the average throughput time in a particular condition, after controlling for the factors in each model.
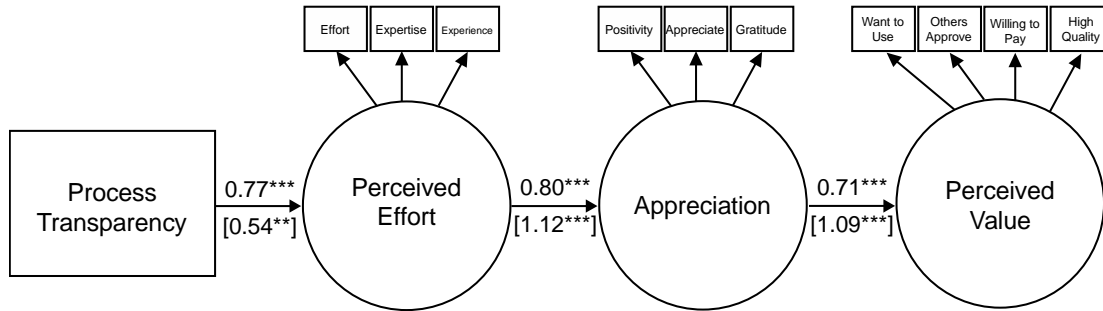
[2] Volunteers were compensated on average $3.17 for their participation in sessions that included this study and another unrelated study. This rate was chosen so as to be commensurate with average daily earnings in the region, ensuring that participants were properly compensated for their time, but not at levels so high as to become coercive.

As this study examined the generalizability of the mechanisms found in Experiment 3A, the procedure and design paralleled those in the earlier study. Participants were thus asked to assume the role of a customer and were randomly assigned to one of three conditions: blind, employee transparency, and process transparency. The same videos were used as in Experiment 3.

Dependent measures. We used the same instruments as in Experiment 3 to measure perceived effort ($\alpha = 0.85$), appreciation ($\alpha = 0.81$), and perceived value ($\alpha = 0.75$).

Results and analysis. Although this population was vastly different from those included in the previous studies, the general positive effects of process transparency still emerged. Participants who observed the chef throughout the process reported higher perceived value ($M = 6.11$, $SD = 1.30$) than those who observed the chef outside the process ($M = 5.54$, $SD = 1.62$); and those who observed neither the chef nor the process ($M = 5.38$, $SD = 1.72$). There was a marginally significant difference between participants who observed the chef throughout the process and those who saw neither the chef nor the process, $t(61) = 1.91$, $P = 0.06$. Perceived effort and appreciation measures followed a similar pattern. Participants observing the chef throughout the process perceived more effort ($M = 6.66$, $SD = 0.83$) and appreciated the provider more ($M = 6.51$, $SD = 0.95$) than participants who saw neither the chef nor the process ($M = 5.97$, $SD = 1.70$; $t(61) = 1.99$, $P = 0.05$), ($M = 5.75$, $SD = 1.79$; $t(61) = 2.08$, $P < 0.05$), respectively. For these items, there were no significant differences between those who observed the chef throughout the process and those who observed the chef outside the process, ($M = 6.16$, $SD = 1.21$; $t(57) = 1.45$, $P = NS$), and ($M = 5.96$, $SD = 1.60$; $t(57) = 1.60$, $P = NS$), respectively. Similar to perceived value, there were no significant differences in perceived effort and appreciation between participants who observed the chef outside the process and those who observed neither the chef nor the process, $t(58) = 0.70$, $P = NS$; and $t(58) = 0.49$, $P = NS$, respectively.

Furthermore, we replicated the path analysis from Experiment 3, and observe a similar pattern of effects (**Appendix Figure 1 -- coefficients in brackets**). Process transparency is positively associated with perceived effort (standardized regression coefficient $\beta = 0.54$, $P < 0.05$), Perceived effort, in turn, is positively associated with appreciation (standardized regression coefficient $\beta = 1.12$, $P < 0.01$), and appreciation is positively associated with perceived value (standardized regression coefficient $\beta = 1.09$, $P < 0.01$). Again, the model exhibited a strong fit, with a Comparative Fit Index ($CFI = 0.855$), and a Root Mean Squared Error of Approximation ($RMSEA = 0.163$, $P < 0.01$). These results provide converging evidence that process transparency offers benefits across cultures, as customers can perceive transparent processes to be more effortful, and experience both increased appreciation for service providers, and higher value perceptions of the service.

Appendix Figure 1: Process transparency path analysis (Experiment 3)

Standardized beta coefficients displayed for Experiment 3. Coefficients for a replication of Experiment 3, conducted in isolated areas of rural Kenya are presented in brackets (See Online Appendix for details). Seeing the employee in process is compared with the baseline condition, during which customers and employees could not observe one another. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

3. Descriptions of experimental conditions (Experiment 4)

Prior to watching the video in Experiment 4, participants read a description of the service design that corresponded with their randomly-assigned treatment. Participants in the *chef does not observe customer* condition read, "You work as a chef in the deli section of a cafeteria that features various stations. Customers place their orders by filling out an order sheet and handing it to one of the staff. The staff brings the order sheet to the kitchen, and you make the sandwich in the kitchen, where customers do not have full view of the sandwich-making process. After you finish making the sandwich, you hand the finished product with complimentary chips and a pickle spear to the same staff, who steps out of the kitchen to deliver to customers. Throughout the entire process, you do not have any opportunity to see your customer." Participants in the *chef observes customer outside the process* condition read, "You work as a chef in the deli section of a cafeteria that features various stations. Customers place their orders by filling out an order sheet and handing it to you. You make the sandwich in the kitchen, where customers do not have full view of the sandwich-making process. After you finish making the sandwich, you step out of the kitchen and hand them the finished product with complimentary chips and a pickle spear. You have an opportunity to see your customer in the beginning when they place their order and in the end when they receive their order." Participants in the *chef observes customer in the process* condition read, "You work as a chef in the deli section of a cafeteria that features various stations. Customers place their orders by filling out an order sheet and handing it to you. You make the sandwich behind the glass window where they have full view of the sandwich-making process. After you finish making the sandwich, you hand them the finished product with complimentary chips and a pickle spear. Throughout the entire process, you have an opportunity to see your customer."