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ANALYSIS OF ALTERNATIVE APPROACHES TO CHIPOTLE MEXICAN GRILL'S SERVICE SYSTEM USING DISCRETE EVENT SIMULATION

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1. INTRODUCTION

Chipotle Mexican Grill is a fast causal restaurant chain headquartered in Denver, Colorado. Founded in 1993, they now have over 1,700 locations across America, as well as internationally (Chipotle 2015). Their product line consists of 4 entrée types, 5 protein types, 2 selections of both rice, and beans, 4 types of salsa, and a small selection of extra toppings (Chipotle 2015). Although the "integrity" of their food is a fundamental part of their business strategy (Chipotle 2015), according to both of their co-CEO's, throughput is also a key factor of focus.

"One important element of delivering great customer service *you've heard us say ov*er and over is faster throughput,*"* co-CEO Monty Moran (Ferdman 2014).

"I think the notion of fast throughput somewhat degrading the customer experience is wrong. If you were to go survey everyone in our lines, they would all want faster throughput,*"* co-CEO Steve Ells (Ferdman 2014).

The most recent upgrade to the service system of Chipotle is their "Four Pillars of Great Throughput" strategy (Ferdman 2014). In short, it simply addresses capacity of workers and preparedness. Without even modifying the core of their system, the results from this initiative have shown great success (Ferdman 2014). However, based on my own experiences and observations, there are several weaknesses still to be improved upon.

2. METHODOLOGY AND RESULTS

To explore potential improvements in service system throughput, as well as customer WIP and cycle time, I use AnyLogic® simulation modeling software to construct a discrete event model of Chipotle's current service system, as well as two proposed alternative systems of my own. The 1st alternative system tackles two key weaknesses of Chipotle's current system simultaneously, which are as follows:

1. The customer ordering procedure causes significant delay in total system processing time.
2. All operations occur sequentially, leaving no flexibility to alleviate weakness 1.

From observations, not all customers are efficient at communicating their orders to assembly line workers. Because no operations occur in parallel to account for these random delays, the total processing time of the system is directly dependent on the ordering ability of customers, thus negatively impacting throughput. My approach to correcting both of these weaknesses consists of utilizing an ordering procedure that has been around since the 1990's (Pape 2011): touchscreens. Instead of having customers communicate their order gradually while their entrées are being assembled, customers would place their complete order on one of multiple touchscreens (using the same software as Chipotle's current online ordering system), and then proceed immediately to the checkout queue for payment. Their order, meanwhile, would be relayed to a monitor at the start of the entrée assembly line to initiate processing. Aside from multiple processes now occurring simultaneously, the other implication of this approach comes from the modification of the order that entrées are assembled. Instead of a policy based on when customers arrive at the restaurant, order of processing would be determined by when customers place their order. Thus, the throughput of the system would be far less dependent on the ordering time of each customer.

The 2nd alternative system contains all modifications involved in the 1st alternative system, as well as an additional improvement, of which I call "Chipotle Cards." Currently, Chipotle's online ordering system mandates that all users have their own account for online transaction security purposes. My proposal for

the 2nd alternative system is for touchscreens to be equipped in such a way that allows customers to swipe their individual "Chipotle Cards" in order to pull up their recent orders and payment information, which can both be saved in their account. Not only would customers then be able to select a recent order, as opposed to having to go through the entire touchscreen ordering procedure, but they would also have the ability to pay at the touchscreen, eliminating the need to wait in the checkout queue.

Following validation of the current system, I perform multiple simulation experiments to assess the performance of both alternative systems compared with the current. The following section provides a brief summary of two analyses conducted for one experiment, and a synopsis of the results. Other experiments completed, but not shown, include system throughput tests with constant WIP levels, and sensitivity analyses considering varying the number of touchscreens, percent of customers using "Chipotle Cards" for ordering, and percent of customers using "Chipotle Cards" for payment.

- Comparison Experiment
  Description: During a time span of approximately 8 hours, data was collected at a local Chipotle on 554 actual customer interactions to develop an arrival schedule. The current, and both alternative models are compared using this arrival schedule. Alternative systems #1 and #2 assume 4 touchscreens. Alternative system #2 assumes 100% of customers use "Chipotle Cards" for ordering and payment.

Table 1: Comparison of average cycle time (minutes) of 554 customers (100 replications).

	Mean	Standard Deviation	% < 5 Minutes	% < 9 Minutes
Current System	5.27	2.59	52%	90%
Alternative System #1	4.11	1.98	69%	99%
% Improvement From Current	22%	24%	33%	10%
Alternative System #2	3.43	1.69	82%	≈100%
% Improvement From Current	35%	35%	58%	11%

- Peak Hour Analysis
  Description: For the same comparison experiment above, only lunch hour (12 p.m. – 1 p.m.) and dinner hour (6 p.m. – 7 p.m.) are examined.

Table 2: Comparison of measures of effectiveness during lunch hour (100 replications).

	Average Cycle Time (min)	Average WIP (cust)	Average Throughput (cust/min)	# Customers Processed	# Entrees Processed
Current System	7.08	10.62	1.50	90	103
Alternative System #1	5.16	8.00	1.55	93	106
% Improvement	27%	25%	3%	3%	3%
Alternative System #2	4.18	6.48	1.55	93	106
% Improvement	41%	39%	3%	3%	3%

3. CONCLUSION

In keeping with initiatives by Chipotle themselves to increase throughput, I have developed two alternative systems that both further improve throughput, as well as significantly lower customer WIP and cycle time. It is expected that the difference between the alternative systems and the current in daily average throughput will be even greater in practice than experiments show, where lower customer WIP and cycle time would attract and retain an increased amount of customers.

REFERENCES

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All data was collected by observing a local Chipotle restaurant. Permission was given to observe by the restaurant manager. I have no affiliation with Chipotle. All views and findings presented are those of my own, and do not represent those of Chipotle.