Modern Menu Engineering: Data-Driven Design

Using data and psychology to create menus that drive profitability while enhancing the guest experience.

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22%	+14%	8.15%	7
Menu size reduction Nobu Group 2021-23	Margin per cover increase post-engineering	Spend increase from removing $ symbols	Max items per category before decision fatigue

Menu Engineering is Not Layout Design

Menu engineering is widely misunderstood as a design exercise. In practice it is an analytical discipline that uses sales volume and contribution margin data to classify every item on a menu and make deliberate decisions about pricing, placement, and continued inclusion. The methodology, first formalised by Kasavana and Smith at Michigan State University in 1982, remains the most reliable framework for improving menu profitability.

The four-quadrant matrix classifies items as Stars (high popularity, high margin), Plowhorses (high popularity, low margin), Puzzles (low popularity, high margin), and Dogs (low popularity, low margin). The strategic response to each category is distinct and counterintuitive for operators unfamiliar with the framework. Plowhorses, for example, are often the restaurant's signature dishes and removing them is not the answer. Repricing or reformulating to improve margin while protecting volume is.

The Data That Drives Decisions

Effective menu engineering requires three data inputs: item sales count, food cost per item, and selling price. From these, contribution margin and menu mix percentage can be calculated. A 90-day sales period provides sufficient data to normalise for weekly patterns and seasonal variation. Most modern POS systems can export this data directly.

Nobu Restaurant Group applied rigorous menu engineering across its global portfolio between 2021 and 2023, reducing menu size by 22 percent while increasing average contribution margin per cover by 14 percent. The reduction in menu complexity also delivered a 9 percent reduction in food waste, validating that fewer, better-performing items improve both financial and operational outcomes.

“Reducing menu size by 22% while increasing margin per cover by 14% — Nobu Restaurant Group's 2021-2023 engineering program.”

Behavioural Design and the Psychology of Choice

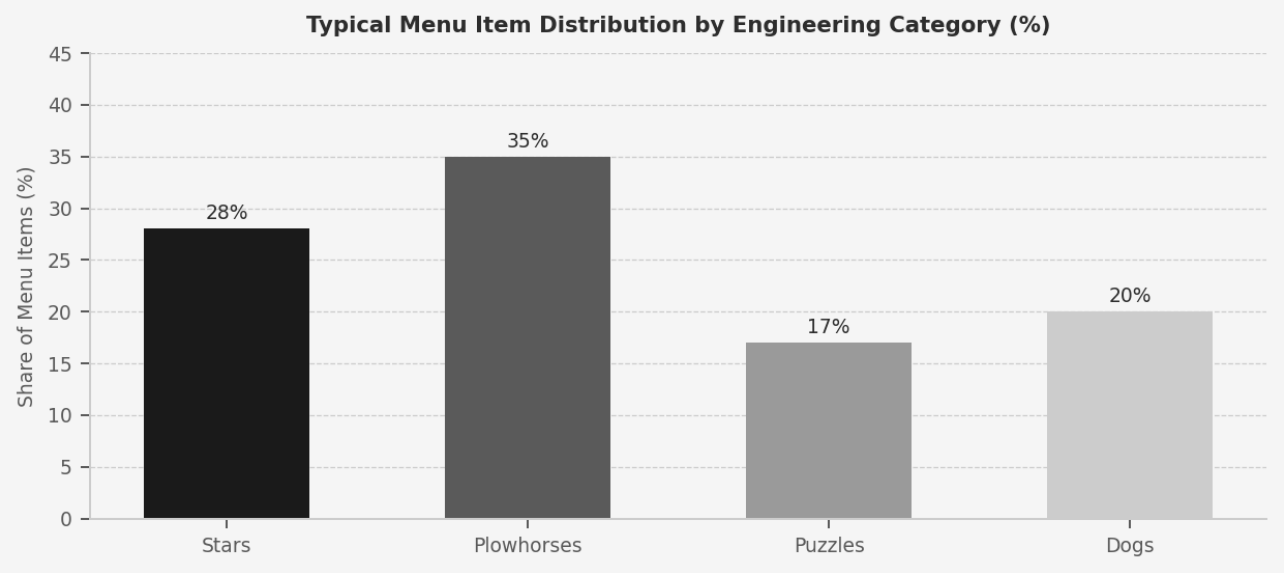
Beyond the analytical framework, menu design incorporates behavioural economics. Research published in the Cornell Hospitality Quarterly found that removing currency symbols from menu prices increased average spend by 8.15 percent. Visual anchoring using premium items at the top of each category lifts mid-tier item selection. Descriptive language that references origin, preparation method, or provenance increases perceived value and willingness to pay.

The number of items presented to a guest is also critical. Barry Schwartz's paradox of choice research, replicated in restaurant settings, shows that menus with more than 7 items per category cause decision fatigue and reduce overall satisfaction. Fast-casual operators including Shake Shack and Sweetgreen have built their brands partly on the confidence of a deliberately limited menu.

Digital Menus and Real-Time Optimisation

Digital menu boards and QR-based ordering platforms have introduced the ability to adjust pricing and item prominence in real time based on time of day, inventory levels, or demand. McDonald's AI-powered dynamic menu boards, tested across 10,000 US locations in 2023, delivered a 1 to 2 percent improvement in average check value by surfacing high-margin items during peak periods. The system uses weather data, time of day, and order history to inform which items are prominently displayed.

For independent operators, the barrier to data-driven menu management has dropped significantly. Tools such as Menu Profit Pro provide item-level contribution margin analysis without requiring advanced analytical skills, making the discipline accessible to operators at any scale.



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