

# EXPRESS METHOD FOR CALCULATING GROSS MARGIN IN E-COMMERCE: A PRACTICAL APPROACH

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**Abstract.** The *purpose* of this study is to present a streamlined approach to calculating the gross margin of online stores, with a particular focus on addressing the specific requirements of small and medium-sized enterprises (SMEs) within the e-commerce sector. This research presents a comparative analysis between the traditional method of gross margin calculation and an express approach that utilises the average order value (AOV) as a central metric. The objective of this study is to evaluate the efficiency and accuracy of the express method, particularly in the context of SMEs that may lack the resources required for more complex financial analyses. *Methodology.* A quantitative research design is employed, utilising data from three online retailers specialising in the sale of home textiles and linens produced by an in-house sewing studio. The shops in question operate on a number of e-commerce platforms, including Rozetka, Etsy, eBay, and Prom.ua. The study encompasses a period of eight months, during which sales data was collected and analysed in order to evaluate the efficacy of both manual and express methods of gross margin calculation. The express method incorporates statistical analysis, including z-scores and normal distribution, to provide a probabilistic framework for the assessment of the likelihood of achieving target gross margin ranges under different pricing scenarios. *Results.* The findings of the study indicate that the express method suggests a probability of achieving a gross margin within the 25-30% range, with a 38.11% likelihood. A case study utilising tulle curtains demonstrates the practical application of the aforementioned method. Following the implementation of a 20% discount, the gross margin experienced a notable decline, from 33.9% to 17.36%. Furthermore, the results of the z-score analysis indicate that the probability of exceeding a 30% gross margin is 27.43%, while the likelihood of the margin falling below 25% is 34.46%. This analysis underscores the inherent risks associated with offering discounts and illustrates the potential for significant fluctuations in profitability contingent upon price adjustments. *Practical implications.* The express method offers invaluable insights that can inform decision-making in a range of retail contexts. To illustrate, an online fashion retailer may utilise the method to evaluate the influence of price increases on gross margin during seasonal promotions. Similarly, a home goods store could employ the method to ascertain the impact of a flash sale discount on profitability, thereby facilitating the balancing of margins with sales volume. *Value / Originality.* The express method introduces a novel approach by integrating AOV and probabilistic analysis into gross margin calculation. This offers a dynamic framework that accounts for variability in discounts and sales, which is a significant advantage over traditional methods that rely on fixed margin targets or historical averages.

**Keywords:** express method of calculating gross margin, average order value (AOV), e-commerce profitability, small and medium-sized enterprises (SMEs), pricing strategies in online retail.

**JEL Classification:** L81, L32, G13

## 1. Introduction

In the contemporary context of e-commerce, online stores assume a pivotal role in addressing consumer needs by facilitating convenient access to goods

and services (Gupta et al., 2023). In the context of intensifying market competition, the ability to generate profits has become a pivotal determinant of a business's capacity to maintain stability and facilitate

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growth. One of the most crucial financial metrics for evaluating the efficiency of an online store is the gross margin, which reflects the relationship between revenue and the cost of goods sold (Arbelo et al., 2021). An accurate gross margin calculation allows entrepreneurs to make informed decisions regarding product assortment, pricing, and strategies to increase profitability (Paragon, 2024). The gross margin of an online store has a direct impact on its capacity to withstand price competition and ensure long-term growth (Wu & Zhao, 2023). The ability to generate high gross margins allows businesses to not only cover their operational costs but also to invest in marketing and technological innovations that enhance the customer experience (IMP Marketing, 2023). Nevertheless, conventional methodologies for calculating gross margin are often intricate and necessitate substantial computational resources, rendering them impractical for small online retailers with a vast product assortment.

The development of rapid and efficacious methodologies for calculating gross margin in online stores is crucial not only for the monitoring of profitability but also for the optimisation of business processes (Zhu, 2022). This paper puts forth a streamlined methodology for calculating the gross margin of an online store, which is founded upon the utilisation of the average purchase value and the margin per product unit. This approach permits a swift evaluation of business profitability without the necessity for intricate financial analyses, which can be especially beneficial for small and medium-sized enterprises. Furthermore, this approach can facilitate more accurate decision-making with regard to pricing and product assortment strategies.

## 2. Literature Review

### *Existing Methods for Calculating Gross Margin*

Gross margin is a key financial indicator that reflects a company's profitability by comparing its revenues to its cost of goods sold (COGS). Numerous studies have been conducted to explore different approaches to calculating gross margin, particularly in the context of e-commerce. Traditional methods of calculating gross margin rely on detailed accounting data, which involves subtracting COGS from total revenue and dividing the result by total revenue (Strong, 2024). This classical method is accurate; however, it necessitates access to comprehensive financial records and detailed product-specific cost analysis, which can prove challenging for small and medium-sized enterprises (SMEs) operating in diverse and dynamic e-commerce environments (Gerpott & Berends, 2022).

Other approaches to calculating gross margin include activity-based costing (ABC) methods, which allocate overheads to specific products based

on their resource consumption (Matsuoka, 2020). While ABC provides a more accurate measurement of product profitability, it requires complex accounting systems and is more suitable for large enterprises with complex operations (Johnson, 2020). These methods are often resource-intensive and may not be practical for small online stores with limited accounting infrastructure.

In recent times, simplified approaches have emerged that focus on calculating gross margin based on specific product categories or average margins across product groups (LeBlanc, 2023; Pavlov, 2021). These methods facilitate a more expedient estimation of overall profitability, obviating the necessity for intricate cost allocation. However, they frequently exhibit a deficiency in the requisite granularity, which impairs their utility in formulating precise pricing or inventory decisions. The express method proposed in this paper builds upon existing simplified approaches by utilising the average purchase value and per-unit profit margin to deliver a rapid and practical assessment of gross margin, specifically tailored to the needs of SMEs in the online retail sector.

### *Studies on Average Purchase Value and Its Application*

The average purchase value, or average order value (AOV), has been the subject of considerable research in the field of e-commerce, as it is regarded as a key indicator of customer behaviour and revenue generation. The AOV is typically calculated by dividing the total revenue by the number of transactions over a specific period (Liu & McCoy, 2023; Li, 2021). A higher average order value (AOV) is often indicative of customers purchasing a greater number of items per order, which can result in enhanced profitability. The extant literature suggests that businesses with higher AOV tend to have superior control over their gross margins, as they are able to distribute fixed costs across a greater number of products (Konings et al., 2011; Xin, 2003). The relationship between AOV and gross margin has been the subject of several studies. For example, Bildea and Gorin (2017) emphasised that concentrating on augmenting AOV through cross-selling and upselling tactics can augment overall profitability without necessitating an increase in customer acquisition costs. Moreover, Alnazer (2013) along with Sinha and Verma (2020) discovered that businesses with a high AOV are better equipped to offer discounts and promotions while maintaining acceptable profit margins.

While AOV is an important metric, it is often underutilised in gross margin calculations. According to Strong (2024), traditional gross margin models typically focus on individual product costs and revenues, rather than considering the broader impact of AOV on profitability. By incorporating AOV into the express method of gross margin calculation, this paper addresses a gap in the literature by demonstrating

how AOV can be used as a practical tool for quickly assessing overall business profitability.

#### *Integration of Simplified Methods in the SME Context*

For small and medium-sized enterprises (SMEs) operating in the e-commerce sector, the necessity for streamlined, time-efficient methodologies of financial analysis is paramount. SMEs frequently lack the financial resources or accounting expertise requisite to implement intricate gross margin calculations, particularly those involving comprehensive cost allocation or sophisticated pricing models (Ami et al., 2023; Ijomah et al., 2024). In light of this, there has been a growing interest in the development of methods that enable business owners to rapidly evaluate profitability without the necessity for comprehensive financial reporting systems.

The express method for gross margin calculation proposed in this paper is consistent with the aforementioned simplified approaches. The method draws upon the insights gained from AOV analysis and focuses on per-unit margin, providing a rapid and actionable metric for use by SME owners. The method's capacity to provide a general estimate of profitability based on average order size and profit per unit is especially beneficial in fast-moving, highly competitive online retail markets.

The *purpose* of this article is to present a simplified express method for calculating the gross margin of an online store developed by the researcher, specially adapted for small and medium-sized enterprises (SMEs) in the e-commerce sector. This method employs the average purchase value (AOV) and per-unit margin to provide a rapid and pragmatic evaluation of profitability, thereby addressing the constraints of conventional, resource-intensive approaches. The objective of the proposed method is to facilitate informed decision-making in e-commerce businesses by providing a simplified approach to gross margin calculations. This enables businesses to make pricing, product assortment, and profitability decisions without the need for complex financial analyses.

The research questions are as follows:

- (1) How can the simplified express method of calculating the gross margin of an online store be used to determine the probability of achieving a gross margin within a given target range?
- (2) How accurate is the express method of calculating gross margin compared to the traditional method of calculating margin on a monthly basis?
- (3) How can the proposed method improve the pricing and profitability decision-making process for online retailers?

### **3. Methodology**

This study uses a quantitative research design to compare the traditional method of calculating

gross margin with a simplified approach based on average order value (AOV). The study is conducted using data from four online stores that sell home textiles and bed linen produced by their own sewing studio. These stores operate on various e-commerce platforms, including Rozetka, Etsy, eBay, and Prom.ua. The entity is a small but growing business that has been operating for two years, making it typical of many small and medium-sized enterprises (SMEs) in the early stages of growth. Although the shops in question tend to focus on a relatively narrow product range, their presence on diverse digital platforms allows for the analysis of performance across different customer bases and market conditions. The variety of cases included in the study enhances the relevance of the findings, as it provides insights into how the AOV-based express method can be applied in dynamic, real-world e-commerce environments. The aim is to evaluate the efficiency and accuracy of the rapid method, especially for SMEs that may not have the resources to conduct complex financial analysis but need effective tools to optimise pricing and profitability.

#### *Description of the Express Method for Calculating Gross Margin in an Internet Shop*

The researcher-developed express method for calculating the gross margin of an internet shop employs key metrics, including the average order value (AOV) and the profit per unit of goods sold. In this study, the online store had a product catalogue comprising 2,500 items, with an AOV of 1,200 UAH per month and a net profit of 100 UAH for each metre of fabric sold. A 4-metre tulle curtain, priced at approximately 1,180 UAH and generating a profit of 400 UAH per transaction, was chosen as the benchmark for the gross margin calculation. This item was chosen because its price is close to the AOV and it represents an average margin product within the store's core offering, providing a reliable basis for estimating the overall gross margin of approximately 30%.

The shop offered a wide range of products, priced from 160 UAH to 20,000 UAH, which made margin calculations more complex. To boost sales during holidays and special events, the store introduced discounts ranging from 5% to 30% on 30 best-selling items. These promotional discounts lowered selling prices and, as a result, the gross margin dropped to as low as ~20%.

In order to refine the gross margin analysis and account for the effect of these discounts, statistical methods, such as z-score analysis, were employed to calculate the probability of achieving margin rates of 20% and 30%. Furthermore, the likelihood of the gross margin falling below 20% or exceeding 30% was calculated, thereby providing insights into the shop's ability to sustain profitability across its entire catalogue, even with the applied discounts.

### Data Collection

The data for this study were collected from the three online shops over the period from January 1, 2024, to August 31, 2024. The sample comprised 833 individual purchases made during the specified time frame across all three shops. To calculate the average order value (AOV), the study employed the embedded statistical tools provided by each marketplace to gather data on total revenue, cost of goods sold (COGS), and the number of transactions. The AOV was calculated by dividing the total revenue by the number of purchases. In order to conduct a margin analysis, the AOV was combined with the per-unit product margins in order to estimate the gross margin, in accordance with the methodology proposed in this paper. The selected product categories were representative of the entire product range sold across the shops, thereby ensuring a comprehensive analysis of profitability across different periods, including monthly and quarterly sales data.

### Ethical Considerations

This study was conducted in accordance with the highest ethical standards to safeguard the interests of the participating e-commerce businesses. The data were collected and used with the explicit permission of the shop owners, who were fully informed about the nature of the study, the methods of data collection, and the intended use of the data. To guarantee the confidentiality of the data, non-disclosure agreements were signed with each participating shop, thus ensuring the protection of sensitive business information.

### Data Analysis

A statistical methodology was employed for the analysis of the sales data across each month of the reported period. Descriptive statistics were calculated for the purpose of evaluating the variability and consistency of the average order value (AOV) and gross margin throughout the sales period. A 4-metre tulle curtain, selected as a reference point due to its price aligning closely with the AOV and representing an average-margin product, was employed to facilitate the standardisation of gross margin estimates across the entire catalogue.

A comparative analysis was made between the traditional method of calculating gross margin and the express method based on AOV. This allowed a detailed assessment of whether the express method, with its simplified approach, provides an accurate and reliable estimate of gross margin. The data was further segmented by month and quarter to examine variations in margin performance, providing insight into potential seasonality or trends affecting overall profitability.

The Z-scores were calculated to determine the probability of achieving gross margins within the target ranges of 20% and 30%, as well as the probability of margins exceeding 30% or falling below 20%.

The Z-score analysis was chosen because it allowed to standardise the data and determine how far the gross margin values deviate from the mean, which is particularly useful when dealing with variable discount rates.

The statistical analysis considered the impact of promotional discounts, ranging from 5% to 30%, on the 30 best-selling items. The IBM SPSS Statistics 30.0.0 software was employed for the purposes of conducting the descriptive statistics, Z-tests, and probability calculations based on the standard normal distribution.

## 4. Results

In order to ascertain the probability of achieving a gross margin within the specified target range of 25-30%, the simplified express method for calculating the gross margin of an online store was applied. The method was based on key metrics, including the average order value (AOV) and the cost of goods sold (COGS). The method was subjected to statistical analysis, employing z-scores and a normal distribution.

To illustrate the method, a 4-metre tulle curtain was sold at a price of 1,180 UAH at a cost of 780 UAH. The gross margin under normal circumstances was calculated as follows:

$$\text{Gross margin} = \frac{1180 - 780}{1180} \times 100 = 33.9\% \quad (1)$$

However, during promotions, when the 30 best-selling items were discounted by 5% to 30%, the selling price and gross margin fluctuated. For example, with a 20% discount, the price of a tulle curtain dropped to 944 UAH, which led to a decrease in gross margin:

$$\text{Discounted price} = 1180 - (1180 \times 0.20) = 944 \text{ UAH} \quad (2)$$

$$\text{Gross margin} = \frac{944 - 780}{944} \times 100 = 17.36\% \quad (3)$$

In order to ascertain the probability of attaining a gross margin within the 25-30% range, a z-score analysis was conducted utilising a mean gross margin of 27% and a standard deviation of 5%. The following formula is used to calculate the probability ( $P$ ).

$$\begin{aligned} P(25\% \leq \text{Gross margin} \leq 30\%) &= \\ &= P\left(\frac{25\% - \mu}{\sigma} \leq Z \leq \frac{30\% - \mu}{\sigma}\right) \end{aligned} \quad (4)$$

Where:  $\mu$  is the mean gross margin;  $\sigma$  is the standard deviation;  $Z$  is the standard normal distribution value.

For a 25% gross margin, the z-score was calculated as:

$$Z_{25} = \frac{25 - 27}{5} = -0.4 \quad (5)$$

For a 30% gross margin, the z-score was calculated as:

$$Z_{30} = \frac{30 - 27}{5} = 0.6 \tag{6}$$

The probability corresponding to a z-score of -0.4 is approximately 0.3446 when a z-table or statistical software is employed, while the probability for a z-score of 0.6 is approximately 0.7257. The probability of the gross margin falling between 25% and 30% is the difference between these two values:

$$P(25\% \leq \text{Gross Margin} \leq 30\%) = 0.7257 - 0.3446 = 0.3811 \tag{7}$$

The result indicated that there was approximately a 38.11% probability that the gross margin would fall within the desired range of 25-30%. This probability reflects the business's capacity to maintain a competitive yet profitable pricing strategy, even while implementing discounts ranging from 5% to 30% on a limited number of best-selling items. As the discounts were applied only to 30 products out of the total 2,500-item catalogue, the overall impact of these promotional discounts on the gross margin is mitigated. This allows the business to achieve a stable margin performance within the target range.

To calculate the probability that the gross margin will be higher than 30% or lower than 25%, the z-score method and normal distribution were continued to be used. For the gross margin level above 30%, the already calculated z-score value for 30% was used (see Formula 7). The probability for  $Z = 0.6$  is approximately 0.7257. This means that the probability of having a gross margin of 30% or less is 72.57%.

So, the probability of having a gross margin above 30% is in addition to this value:

$$P(\text{Gross Margin} > 30\%) = 1 - 0.7257 = 0.2743 \tag{8}$$

Thus, there is a 27.43% probability that the gross margin will be higher than 30%.

Conversely, for a gross margin rate lower than 25%, the z-score for 25% was calculated (see Formula 6). The probability of  $Z$  equalling -0.4 is approximately 0.3446. This is the probability of a gross margin rate that is lower than 25%:

$$P(\text{Gross Margin} < 25\%) = 0.3446 \tag{9}$$

Accordingly, there is a 34.46% probability that the gross margin will be less than 25%.

*Comparison of Manually Calculated Gross Margin and Express Method*

In comparing the gross margins calculated manually with those derived from the express method, it is essential to acknowledge that the data employed in the latter were averaged across the entire period, whereas the former were disaggregated by month. This significant divergence in the methodology of data aggregation has an impact on the resulting outcomes, necessitating an adjustment to ensure that the comparison is conducted in a manner that is consistent with the approach used.

Based on the data from the manual and rapid methods available for comparison in Figure 1, a detailed analysis of the period presented in the figure shows the following.

(1) AOV comparison:

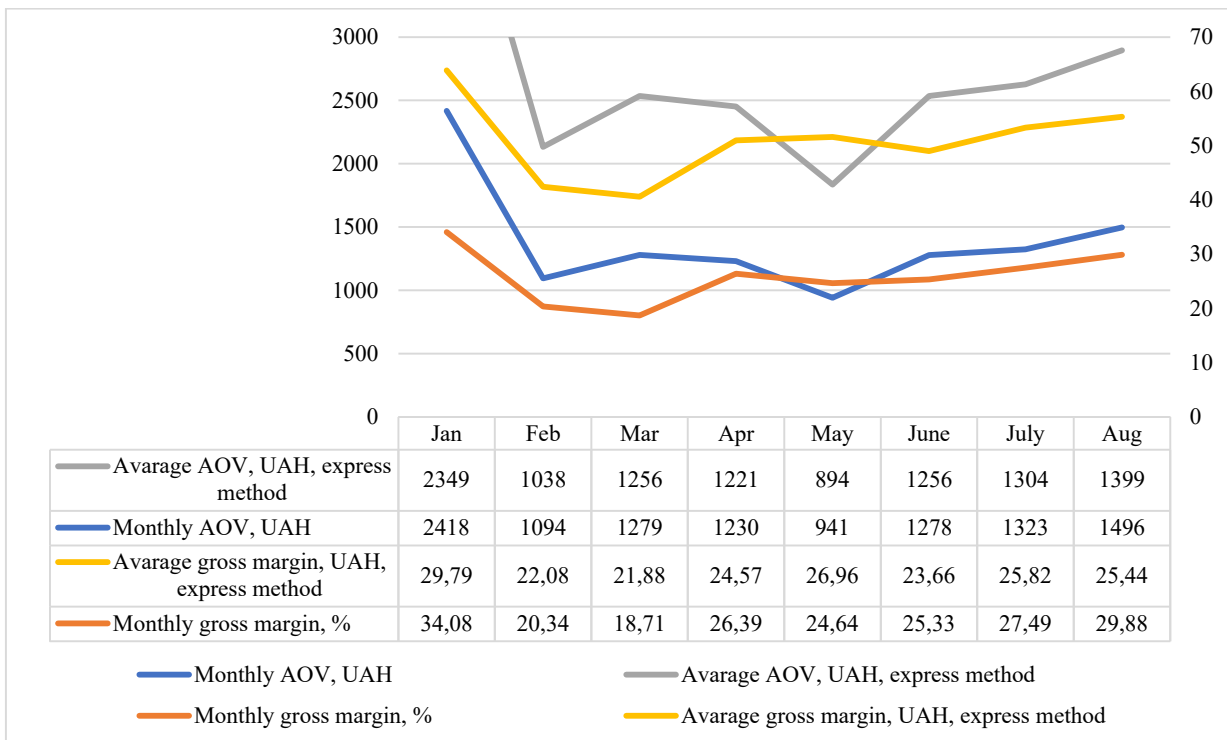


Figure 1. Comparison of monthly AOV and gross margin: manual vs. express method

The mean AOV, calculated manually over the eight-month period, is 1,507.38 UAH, which is slightly higher than the 1,464.63 UAH calculated by the express method. This smaller discrepancy indicates that the express method more accurately approximates the AOV compared to the previously assumed value of 1,200 UAH. Nevertheless, variations are still evident on an individual basis across the various months. To illustrate, in January, the manually calculated AOV is 2,418 UAH, whereas the express method estimates it at 2,349 UAH. This demonstrates that the express method mitigates fluctuations. A comparable discrepancy is observed in February, where the manual AOV is 1,094 UAH and the express method estimates it at 1,038 UAH. This suggests that while the express method is effective in identifying general trends, it may produce an underestimation in instances where there are significant fluctuations, such as those observed in March and May.

(2) *Gross margin comparison:*

The mean gross margin calculated manually is 25.98%, which is slightly lower than the 25.78% estimated using the express method. The discrepancy of approximately 0.2% indicates that the express method provides a highly precise approximation of the overall gross margin, enhancing its earlier estimation of 27%. Nevertheless, in certain months, the express method yields gross margin estimates that are either slightly over- or underestimated. To illustrate, in January, the manual gross margin is 34.08%, whereas the express method estimates it at 29.79%. This considerable discrepancy indicates that the express method is unable to fully account for the influence of months with elevated gross margins. Conversely, in March, where the manual gross margin is 18.71%, the express method produces an overestimation of 21.88%. A comparable overestimation is observed in the cases of February and June.

*AOV fluctuations.* Although the express method is effective in approximating AOV overall, it is still prone to underestimating months with extreme AOV values, particularly high or low periods such as January and May. The express method appears to mitigate the fluctuations, which may result in less precise forecasts for months with high variation.

*Gross margin variability.* The express method demonstrates a relatively consistent approximation of the gross margin; however, it is less effective at capturing months with significant variation in profitability, such as January (high margin) and March (low margin). In months such as June and July, where gross margins are more stable, the express method provides accurate estimates, with differences of up to 0.5%.

The results indicate that the simplified express method, developed by the researcher, is a reliable and efficient approach for calculating the probability

of achieving target gross margin ranges. By focusing on key metrics such as average order value (AOV) and cost of goods sold (COGS), in conjunction with z-score analysis, this method provides valuable insights for the management of profitability in an online store, particularly one with a diverse range of product prices and promotional strategies.

The proposed method offers substantial improvements in decision-making processes for product pricing and profitability in the context of online retail. It provides a probabilistic framework for evaluating the probability of achieving a desired gross margin range. By employing key metrics such as average order value (AOV) and cost of goods sold (COGS), this method allows retailers to assess the probability of maintaining a pricing strategy that is both competitive and profitable. This enables retailers to make well-informed decisions, striking a balance between competitiveness and profitability in order to optimise the efficacy of their pricing strategies. Furthermore, the method's utilisation of z-score analysis and normal distribution provides a robust statistical foundation for evaluating the probability of meeting a target gross margin range, thereby reducing the uncertainty associated with pricing decisions.

The proposed methodology also facilitates data-driven decisions on product pricing and profitability by allowing retailers to simulate different pricing scenarios and assess their likely impact on gross margin. By adjusting variables such as AOV and COGS, retailers can explore different pricing scenarios and assess their potential impact on gross margin, thereby identifying the most effective pricing strategies. This capability permits retailers to proactively modify their pricing strategies in response to evolving market conditions or shifting consumer preferences. The method's flexibility and adaptability render it a versatile instrument applicable to a diverse array of product categories and online retail settings, assisting retailers in optimising their pricing strategies and enhancing profitability in the context of today's dynamic e-commerce landscape.

## 5. Discussion

The application of the simplified express method for calculating the gross margin of an online store, developed by the researcher, demonstrates its potential to enhance decision-making in pricing and profitability. By leveraging key metrics such as average order value (AOV) and cost of goods sold (COGS), and incorporating statistical analysis through z-scores and normal distribution, this method offers a probabilistic framework for evaluating the likelihood of achieving a target gross margin range. The results indicate that there is approximately a 38.11% probability of achieving a gross margin within

the 25-30% range, which provides valuable insights into the maintenance of a competitive yet profitable pricing strategy.

The express method presents a novel approach to gross margin calculation, whereby AOV and probabilistic analysis are applied. In contrast to conventional methodologies, which frequently rely on historical averages or fixed margin targets (Wenxiang et al., 2019; Konings et al., 2011), the express method's probabilistic framework offers a dynamic tool that accounts for variability in discounts and sales, thereby providing more accurate profitability estimates for online retailers (Saeede & Hossein, 2020; van Schaik, 2014). Nevertheless, a more comprehensive comparison with established techniques such as activity-based costing (ABC) or trend analysis would provide further evidence of its efficacy, particularly in relation to time efficiency and adaptability to fluctuating sales environments.

*Practical application.* To illustrate the practical benefits of this method in decision-making, consider the following scenarios.

*Seasonal pricing strategy.* An online fashion retailer preparing its pricing strategy for the summer season can use a rapid method to estimate the probability of achieving its target gross margin at different price levels. By applying this method, they may find that a 10% price increase compared to the previous year gives them a 45% chance of achieving their target gross margin of 30%, while a 5% increase gives them a 60% chance of achieving a margin of 25-28%. This insight allows them to better balance the trade-off between higher margins and sales volume by optimising their seasonal strategy.

*Flash sale decision.* An online homeware retailer planning a 24-hour flash sale with a 30% discount on all products can use a rapid method to determine the impact on profitability. The method shows that this discount will reduce the probability of achieving the target gross margin of 25-30% from 38.11% to 22.5%, providing the retailer with data to assess whether the expected increase in sales will justify the decrease in margin. In addition, the retailer can adjust the amount of the discount or apply it selectively to minimise the impact on margins.

*New product line pricing.* An electronics retailer launching a new line of smart home devices may utilise the express method to simulate disparate pricing scenarios and thereby assess their impact on gross margin probabilities. To illustrate, the retailer may ascertain that pricing the new products at a premium increases the probability of exceeding a 30% margin from 27.43% to 35%, thereby offering a clear basis for positioning the new line.

*Inventory clearance strategy.* A bookstore seeking to dispose of slow-moving inventory may employ the express method to ascertain the optimal discount

level. To illustrate, the method may demonstrate that a 40% discount reduces the probability of attaining a positive gross margin to 15%, whereas a 25% discount maintains a 50% chance of remaining within the target margin range. This enables the retailer to adopt a strategic approach to discounting without jeopardising profitability.

The example of tulle curtains illustrates the practical application of this method. Under normal pricing conditions, the gross margin was 33.9%, while with a 20% discount, it dropped to 17.36%. This demonstrates how promotional discounts can have a significant impact on gross margins, which confirms the need for careful management of discounts to maintain profitability.

The z-score analysis provides further clarification regarding the probability of achieving gross margins that fall outside the target range. The probability of a gross margin exceeding 30% is 27.43%, while the chance of it falling below 25% is 34.46%. These probabilities serve to highlight the inherent risks and variability inherent in the achievement of desired margin levels, particularly in the context of the application of discounts.

This study has shown that the rapid method has a number of advantages over traditional approaches:

(1) *Probabilistic framework.* The utilisation of z-scores and normal distribution within the express method provides a probabilistic framework for the evaluation of gross margin, which is more sophisticated than that afforded by simple average-based calculations (Sulewski & Wąs, 2018). This approach enables retailers to evaluate the probability of attaining target margin levels under diverse pricing scenarios, incorporating a spectrum of sales and discounting behaviours.

(2) *Dynamic discount impact analysis.* The method accounts for the effects of promotional discounts in a dynamic manner, thereby providing a more accurate representation of profitability under varying sales conditions (Anitha et al., 2024; Mina & Seyyed-Mahdi, 2023). This constitutes a notable enhancement over the static methods that frequently prove inadequate in accounting for the intricate interplay between discounts and margin performance.

(3) *Efficiency and flexibility.* The express method offers a more efficient and adaptable tool for pricing strategies than traditional methods, which often require more complex and time-consuming analysis (Andrus, 2024; Kashyna et al., 2022). This is particularly important for e-commerce businesses, where prices and promotions can change frequently and rapid decision making is critical.

The results of this study indicate that the simplified express method, developed by the researchers, is a reliable and efficient approach for calculating the probability of achieving target gross margin ranges. By focusing on key metrics such as AOV and COGS,

in conjunction with z-score analysis, this method provides valuable insights for managing profitability in an online store, particularly one with a diverse range of product prices and promotional strategies.

#### *Limitations*

The express method has two main limitations: potential accuracy issues and the impact of discounts.

(1) *Potential accuracy issues.* Although the use of AOV facilitates calculations, it may not fully account for the variability in sales prices and costs, particularly in instances of pronounced fluctuations. Significant alterations in product prices or costs, in addition to considerable variability among products, have the potential to impact the precision of gross margin projections. One potential solution is the introduction of weighted AOVs for different product categories, or alternatively, a hybrid method that adjusts for variability.

(2) *Impact of discounts.* Variable discounts applied to different products can distort both AOV and gross margin calculations. In particular, large discounts on high margin items can have a disproportionate impact on the overall margin. This highlights a potential limitation of the express method in accounting for different promotional impacts. To improve this, the method could be refined to include tiered discount models or more sophisticated discount scenarios that take into account the interaction between discount depth and product profitability.

These limitations indicate that although the express method provides a quick estimate of gross margin, it may not always reflect the detailed dynamics of pricing and discounting in practice.

## 6. Conclusions

This study demonstrates the usefulness of the proposed express method for calculating gross margin for online retailers, highlighting its practicality and effectiveness in providing a probabilistic framework for assessing profitability. The express method, which uses average order value (AOV) and cost of goods sold (COGS) to estimate gross margin, simplifies the process of assessing profitability and provides insight into the likelihood of achieving target gross margin ranges. The utilisation of z-score analysis and normal distribution provides a robust statistical foundation for the comprehension of margin probabilities, thereby assisting retailers in the formulation of well-informed pricing decisions. Nevertheless, the research also demonstrates that variable discounts and product price fluctuations can have a considerable impact on gross margin calculations, emphasising the necessity of considering these variables for accurate profitability assessments. A comparison with manual calculations reveals that while the express method provides a reasonably accurate estimate, it tends to slightly

overestimate gross margin compared to actual month-by-month data. The mean gross margin calculated manually was slightly lower, indicating that the express method may mitigate extreme fluctuations while still providing a useful approximation for expedient assessments. The expediency and straightforwardness of the method render it a practical option for online retailers, particularly those overseeing a vast array of products and promotional strategies. It facilitates a harmonious equilibrium between competitiveness and profitability. In conclusion, the express method represents a novel approach with notable advantages in terms of speed and simplicity. However, it is essential to address the limitations associated with its variability and discount impact. Further research could concentrate on the refinement of the method to incorporate seasonality and month-to-month variability in a more effective manner. Additionally, its applicability to different product categories and retail settings could be investigated with a view to further validating and enhancing its utility.

## Recommendations

The following recommendations are offered to improve the practical application of the express method.

(1) *Incorporate seasonality adjustments.* To better account for fluctuations from month to month, integrating seasonality adjustments can improve the accuracy of the method. This will help account for fluctuations in sales and discounts throughout the year.

(2) *Consider variable discounts.* Customise the method to model different discount scenarios more accurately. By taking into account the ranges of potential discounts, retailers can get a more accurate estimate of gross profit under different promotional conditions.

(3) *Enhance flexibility.* Consider adjusting for products with high variability or promotions that differ significantly from average conditions. This may include segmenting products into categories with different discount and markup profiles.

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### Conflict of Interest

The researchers disclosed all potential conflicts of interest, including any financial relationships with e-commerce platforms or participating shops, in accordance with the current ethical standards for research practice. The aforementioned declarations were duly recorded and are available for inspection

upon request. In order to guarantee transparency and reciprocity, the researchers pledged to disseminate the aggregated findings with the participating shop owners with the objective of potentially optimising their business practices. This approach is in accordance with the ethical guidelines that govern research involving commercial entities.

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