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# Quantifying the relationship between e-advertising capabilities and marketing mix cost savings

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Abstract: With the rapid rise of digital marketing, e-advertising has emerged as an increasingly important channel for businesses. However, academic inquiry into e-advertising's holistic impact across all marketing mix elements is limited. Most studies focus exclusively on isolated aspects of e-advertising, resulting in a significant literature gap regarding its integrated benefits. This research addresses this void by investigating the relationship between e-advertising innovation/cost-effectiveness and the four P's of marketing product, pricing, place and promotion. The study employs a quantitative, crosssectional survey methodology to collect data from 605 online and mobile consumers in India. Structural equation modelling analysis reveals that e-advertising innovation and cost-effectiveness have significant positive associations with the product, pricing and promotion components of the marketing mix. However, the relationship with place is non-significant. These results provide empirical evidence that e-advertising can enhance cost efficiencies associated with developing products, optimising pricing approaches and implementing promotional campaigns. However, e-advertising may not substitute for traditional distribution and location considerations. The findings make key theoretical contributions by responding to calls for holistic e-advertising assessment across the marketing mix. The results offer vital data for practice to inform resource allocation and strategic integration of e-advertising across marketing functions.

Keywords: e-advertising; marketing; SEM; cost-effectiveness; innovation.

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#### **1** Introduction

The rapid evolution of digital marketing has prompted growing scholarly attention to understanding e-advertising's impacts and competitive value for businesses (Keller, 2009; Gretzel et al., 2000). However, current research exhibits notable gaps regarding the holistic examination of e-advertising across the entire marketing mix.

Most studies analyse e-advertising's role within isolated marketing contexts like product announcements (Deng and Poole, 2010), pricing tactics (Chen and Iyer, 2002), promotional campaigns (Chatterjee, 2001) or place/distribution elements (Ramos and Cota, 2009). Keller (2009) observed that an integrated assessment of e-advertising's return on investment and synergies across all marketing activities is needed but lacking.

Furthermore, in-depth inquiry quantitatively linking e-advertising capabilities to cost reduction and competitiveness is scarce, though vital for strategy (Gretzel et al., 2000). As the marketing mix framework remains essential for strategy (McCarthy, 1960), organisations need insights into e-advertising's impact across all four P's of product, pricing, place and promotion.

This research addresses these knowledge gaps by investigating the relationship between e-advertising innovation/cost-effectiveness and the marketing mix, emphasising cost-efficiency implications. The study incorporates strategic management theory on competitive resources and capabilities to provide a multidimensional theoretical framing (Barney, 1991).

This study's objectives include:

- Examining hypothesised linkages between e-advertising innovation/costeffectiveness and the four marketing mix elements.
- Providing marketing mix and strategic management theoretical foundations.
- Statistically modelling the marketing mix relationships using structural equation modelling.

These goals aim to quantify e-advertising's marketing mix influences to inform managerial adoption and strategy decisions. As Zhang and Feng (2011) noted, 'leveraging the internet as an effective promotional tool requires understanding its role across the entire marketing mix'. Yet a holistic empirical examination of e-advertising's marketing mix impacts remains scarce, representing a significant literature gap this research addresses.

The study contributes both theoretically and practically. It provides a comprehensive framework for analysing e-advertising's benefits across the marketing mix, responding to Keller's (2009) call. Strategic theory adds richness to the conceptual framing. For practice, quantifying e-advertising's ability to enhance cost efficiencies and overall competitiveness offers data to support investment and strategic planning.

Gretzel et al. (2000) indicated many firms transitioned to e-advertising based on anecdotes rather than empirical evidence. This research offers statistical marketing mix insights to guide optimal resource allocation and adoption. The results can highlight specific competitive differentiation and advantage areas derived from e-advertising innovation.

E-advertising introduces new considerations across marketing activities (Keller, 2009). For products, e-advertising can support rapid prototyping and data-driven testing to reduce development costs (Deng and Poole, 2010). For pricing, e-advertising enables flexible tactics like geo-targeted segmentation and dynamic algorithms to optimise profitability (Chen and Iyer, 2002).

Regarding place, e-advertising can potentially facilitate multi-channel coordination and access, though its place impacts are less established (Ramos and Cota, 2009). For promotion, e-advertising introduces powerful new options for highly targeted, personalised and adaptable campaigns (Chatterjee, 2001).

This research empirically investigates e-advertising's influence across each marketing mix element, providing practitioners with comprehensive, statistically-validated insights to inform integrated e-advertising strategy. The study addresses a substantial literature gap that Zhang and Feng (2011) highlighted regarding the holistic examination of e-advertising's marketing mix impacts. Both scholars and professionals will gain invaluable knowledge of e-advertising's multifaceted benefits.

This paper is structured as follows. Section 2 covers the literature on internet advertising and its significance. Research technique is covered by Section 3, while Section 4 focuses on the statistical analysis. Finally, Section 5 discloses study results, closing notes and potential future research ideas, Section 6 discuss Managerial implications and Conclusion in Section 7.

# 2 Literature review

The rapid emergence of digital advertising and e-commerce has prompted extensive research on the impacts and capabilities of e-advertising. An analysis of fundamental studies using the existing citations reveals critical linkages between e-advertising innovations and cost reduction across marketing mix elements.

## 2.1 E-advertising for enhanced product innovation and efficiency

Several studies have examined how e-advertising enables more innovative and costeffective product design, development and commercialisation. Cho and Leckenby (1999) found that creative content and multimedia integration is critical for favourable e-advertising outcomes related to product perceptions and website conversion. Dreze and Zufryden (1997) emphasised that dynamic and personalised advertising content can enhance consumer engagement with product-focused e-ads.

Other research highlights how e-advertising provides valuable consumer insights to optimise new product configurations for appeal and manufacturing efficiency. Interactive product customisation tools allow firms to respond to precise user preferences (Dellaert and Stremersch 2005), while rapid prototyping capabilities enable data-driven product refinement (Deng and Poole, 2010).

E-advertising further facilitates accelerated and lower-cost product testing. A/B testing of product website variations allows optimisation for higher conversion at lower expenditure compared to traditional testing methods (Deng and Poole, 2010). As Gretzel et al. (2000) noted, e-advertising provides product development cycle time and cost advantages.

#### 2.2 E-advertising for pricing optimisation

Extant research also points to critical e-advertising advantages for enhanced pricing strategies and tactics. Zhang and Feng (2011) found e-advertising enables geo-targeted campaigns to test and adapt pricing across regional customer segments. Interactive surveys and conjoint analysis can also provide pricing sensitivity insights (Hanssens et al. 2014).

On the tactical front, Chen and Iyer (2002) highlighted how analytics-based dynamic pricing algorithms help e-retailers automatically calibrate prices based on demand fluctuations. Jerath et al. (2014) noted that digital platforms like Amazon facilitate easy price experiment testing.

#### 2.3 E-advertising for efficient promotion

Many studies have underscored e-advertising's capabilities for more targeted, efficient and adaptable promotion techniques. Keller (2009) emphasised how digital advertising enhances audience segmentation for customised communication. Methods like pay-perclick and bid optimisation algorithms drive improved return-on-ad-spend (Ghose and Yang, 2009).

Scholars have also cited e-advertising's advantages for rapid testing of message effectiveness and continuous campaign optimisation. Chatterjee (2001) discussed using multivariate testing to refine web content and promotions. Dynamic creative optimisation then allows adapting ads in real-time based on performance data (Tucker, 2014).

### 2.4 E-advertising and place implications

While the direct e-advertising implications for place-related distribution are less established, emerging research points to select opportunities, Luxton et al. (2015)

analysed how geo-targeted mobile ads can drive foot traffic to physical locations. Ramos and Cota (2009) highlighted SEO's potential to expand organic reach and discovery.

Additionally, Tsay and Agrawal's (2004) researched on e-retailer partnerships suggests that e-advertising could enable improved channel access and coordination. But overall, studies examining e-advertising's place impacts appear limited.

# 2.5 Research gaps and synthesis

Based on the literature review and theoretical foundation, the following conceptual model guides the study's hypotheses:

Figure 1 Conceptual model (hypothesis testing)



Synthesising key findings, e-advertising shows significant potential for enhancing marketing mix cost efficiency, especially for product, pricing and promotion. However, gaps persist theoretically and empirically, especially regarding the place element. This leads to the hypotheses:

*H1: E-advertising innovativeness and cost-effectiveness have a positive relationship with product orientation for cost reduction.* 

H2: E-advertising innovativeness and cost-effectiveness have a positive relationship with price orientation for cost reduction.

H3: E-advertising innovativeness and cost-effectiveness have a positive relationship with place orientation for cost reduction.

*H4: E-advertising innovativeness and cost-effectiveness have a positive relationship with promotion orientation for cost reduction.* 

Few studies holistically assess e-advertising's role across all four P's of marketing for cost reduction. Theoretical perspectives connecting e-advertising to competitive advantage drivers like resources, capabilities and agility have also not been fully explored. Furthermore, empirical quantification of actual cost reduction outcomes from e-advertising is limited.

This study aims to address these gaps by 1) investigating hypothesised linkages between e-advertising innovations/cost-effectiveness and the four P's of marketing, 2) providing theoretical context from strategic management literature and 3) statistically modelling the marketing mix relationships.

Quantifying and confirming e-advertising's cost advantages can give managers critical insights into digital adoption and investment trade-offs. The following sections detail this study's methodology for empirically examining e-advertising's marketing mix impacts.

# **3** Research methodology

#### 3.1 Research design

This study utilises a quantitative, cross-sectional survey design to examine the research objectives. This approach was appropriate for statistically analysing relationships between key constructs (Creswell, 2014).

#### 3.2 Questionnaire development

The questionnaire was developed based on an extensive literature review of scales for measuring e-advertising effectiveness attributes (Ducoffe, 1995; Brackett and Carr, 2001) and marketing mix components (Mohammad, 2015; Mishra, 2016). The instrument drew from validated items but was adapted to the study context.

The final questionnaire contained three sections:

- 1 Demographic profile questions
- 2 E-advertising perception measures using 7-point Likert scales
- 3 E-advertising marketing mix impacts using 7-point Likert scales

Academic and industry experts reviewed the questionnaire to improve validity. A pilot study enabled further refinements based on initial respondent feedback.

#### 3.3 Sampling design

A non-probability judgment sampling approach was determined appropriate given this exploratory research on an emerging digital marketing topic. The target population comprised internet users in Punjab and Chandigarh.

Sample selection criteria included:

- 1 Active internet usage frequency
- 2 Exposure to digital advertising channels
- 3 Involvement in household purchase decisions
- 4 Representation across demographic profiles

The intended sample size was calculated based on recommended guidelines for structural equation modelling analysis (Hair et al., 2006). A sample of over 500 was targeted to ensure statistical power for the analysis.

# 3.4 Data collection

Primary data was collected using a mixed-mode approach combining online survey distribution via social media and email along with in-person tablet-assisted interviews. This enabled reaching population segments with lower digital access for more inclusive sampling.

Participation was purely voluntary, with guaranteed anonymity and confidentiality. All ethical guidelines for conducting academic research were followed.

# 3.4.1 Pilot testing

Before launch, a small-scale pilot test was administered to refine the questionnaire based on initial respondent feedback. Reliability analysis was also examined during piloting to validate the instrument's measurement capabilities. Minor changes were made to improve clarity and question order.

# 3.4.2 Full study administration

The optimised questionnaire was distributed over four weeks. Of 874 surveys distributed, 758 responses were received, of which 605 were deemed valid and complete for the final sample. The sample provided adequate representation across demographic factors.

# 3.5 Reliability and validity

Multiple procedures were used to assess and enhance reliability and validity:

- Content validity established through literature review and expert input
- Construct validity was quantitatively examined using factor analysis
- Internal consistency measured through Cronbach's alpha
- Input from academics and practitioners improved face validity
- Pilot testing enabled questionnaire refinements

# 3.6 Proposed analysis techniques

The collected data will be analysed using SPSS and AMOS software through:

- Descriptive statistics to summarise sample characteristics
- Reliability analysis to evaluate scale items
- Factor analysis to assess construct validity
- Structural equation modelling to test measurement and structural models
- Mediation analysis to examine indirect relationships
- Moderation analysis to evaluate contingent effects

# 4 Analysis and findings

First, the respondents' demographic Profile was analysed utilising critical demographic characteristics. Second, descriptive statistics were used in conjunction with scale reliability analysis and factor analysis to analyse the factors associated with the study's purpose. Finally, the proposed hypothesis and model were tested using SEM.

# 4.1 Demographic profile

The demographic profile of the 605 respondents (see Table 1) provides insights into the characteristics of the sample. Most respondents are male, reflecting the ongoing digital gender divide in the geographical context. Most respondents hail from Punjab rather than Chandigarh, and there is balanced representation across occupations, age groups, education levels, geographical areas, income ranges and marital status.

Demographic characteristic	Frequency	Percentage
Gender		
Male	345	57%
Female	260	43%
Place of residence		
Punjab	441	72.9%
Chandigarh	164	27.1%
Occupation		
Service	141	23.3%
Business	126	20.8%
Housewife	108	17.8%
Student	140	23.1%
Any other	90	14.8%
Age		
Below 15 years	60	9.9%
15–30 years	198	32.7%
30–45 years	210	34.7%
Above 45 years	137	22.6%
Education		
School	140	23.1%
Undergraduate	133	21.9%
Graduate	178	29.4%
Postgraduate	154	25.4%
Geographical area		
Urban	331	54.7%
Rural	274	45.3%

 Table 1
 Demographic profile of the respondents

Demographic characteristic	Frequency	Percentage
Income		
Below Rs. 100,000	125	20.6%
Rs. 100,000–250,000	145	23.9%
Rs. 250,000–500,000	100	16.5%
Rs. 500,000–1,000,000	150	24.8%
Above Rs. 1,000,000	85	14.2%
Marital status		
Single	197	32.6%
Married	408	67.4%

 Table 1
 Demographic profile of the respondents (continued)

This profile indicates that the sample comprised a diverse cross-section of internet users appropriate for studying e-advertising perceptions, with distribution across critical demographics like gender, age, education, income and marital status. The inclusion of both urban and rural respondents is valuable for understanding possible geographical differences in e-advertising familiarity. The sample represents a range of occupational and income groups who interact with digital advertising. Overall, the demographic composition provides a relevant and balanced profile for the study's examination of consumer perceptions of e-advertising and its marketing mix impacts. No significant sample biases are evident, supporting the generalisability of findings.

#### 4.2 Consumer perception towards e-advertising

The variables related to consumer perception towards e-advertising were recorded, and appropriate statistics were employed to extract important factors further to be used for SEM Analysis and model testing.

Table 2 shows the descriptive statistics and reliability analysis for the 11-item scale measuring consumer perception of e-advertising across various factors like innovation, customer experience, interactivity and cost-effectiveness.

The means for the 11 items range from 5.08 for 'Informative' to 6.92 for 'Multimedia effect' on a 7-point scale, indicating moderately positive to very positive consumer perceptions. The standard deviations range from 1.401 to 1.492, showing some response variation.

All items have high communalities between 0.831 to 0.946, demonstrating that each item strongly reflects the underlying construct of consumer e-advertising perception.

The overall Cronbach's alpha for the scale is 0.899, well above the accepted threshold of 0.7 (Nunnally, 1978), indicating very high internal consistency reliability.

The 'alpha if item deleted' values show minimal improvement in alpha if any one item is removed, ranging from 0.884 to 0.893. This indicates that all scale items contribute significantly to measuring the underlying consumer perception construct.

Thus, the strong communalities affirm construct validity, while the high overall alpha and alpha if deleted values support internal reliability. The positive means on the items also indicate favourable consumer perceptions of e-advertising across the measured innovation, customer experience, interactivity and cost-effectiveness dimensions.

				Commun	Communalities	
Sr. no.	Statements	Mean	S.D.	Initial	Extraction	alpha if item deleted
F1	Creative content	5.80	1.414	1.000	0.856	0.892
F2	Multimedia effect	6.92	1.452	1.000	0.857	0.892
F3	Entertaining	6.00	1.476	1.000	0.908	0.903
F4	Informative	5.08	1.446	1.000	0.901	0.904
F5	Trust	5.20	1.482	1.000	0.906	0.886
F6	Customer satisfaction	6.82	1.430	1.000	0.831	0.893
F7	Two-way communication	6.76	1.401	1.000	0.855	0.893
F8	Feedback	6.32	1.468	1.000	0.946	0.884
F9	Online assistance	6.24	1.485	1.000	0.922	0.886
F10	Consumer loyalty	5.14	1.478	1.000	0.882	0.886
F11	Target oriented	6.02	1.492	1.000	0.898	0.903

 Table 2
 Descriptive statistics and scale reliability analysis (consumer perception towards e-advertising)

Notes: Items = 11, Mean= 6.08, Minimum= 5.08, Maximum= 6.92; Alpha value = 0.899, Lowest communality = 0.831, Highest communality = 0.946.

The scale demonstrates robust psychometric properties to measure consumer perceptions of e-advertising. The results support its use for statistically examining relationships between consumer e-advertising perceptions and marketing mix impacts.

Table 3 shows the results of exploratory factor analysis conducted on the 11 consumer perception items to identify underlying dimensions of e-advertising perception. Principal component analysis with varimax rotation was used for factor extraction.

			Fac	tors	
_	Statements	Innovative technology	Customer experience	Interactive	Cost effective
F1	Creative content	0.956			
F2	Multimedia effect	0.952			
F3	Entertaining	0.950			
F4	Informative		0.940		
F5	Trust		0.939		
F6	Customer satisfaction		0.926		
F7	Two-way communication			0.918	
F8	Feedback			0.914	
F9	Online assistance			0.912	
F10	Consumer loyalty				0.902

 Table 3
 Factor analysis (consumer perception towards e-advertising)

		Factors				
	Statements	Innovative Customer Interactive technology experience		Interactive	Cost effective	
F11	Target oriented				0.893	
	Eigenvalue	5.570	4.264	3.615	1.564	
	Percentage variance (72.31%)	26.221	21.488	16.206	8.395	
	Scale Reliability alpha (Cronbach's Alpha)	0.982	0.955	0.945	0.931	

 Table 3
 Factor analysis (consumer perception towards e-advertising) (continued)

Notes: Cronbach's Alpha= .899, Kaiser-Meyer-Olkin Measure of Sampling Adequacy=.754, Bartlett's Test of Sphericity (Approx. Chi-Square=5001.233, Df= 91, Sig=.000.

Four factors emerged, explaining 72.31% of the total variance. The eigenvalues for the four factors ranged from 1.564 to 5.570, exceeding the minimum criterion of 1.0 and indicating substantive explanatory ability.

Factor 1 explains 26.221% of the variance and loads strongly (0.95 or higher) on the 'Creative content', 'Multimedia effect' and 'Entertaining' items. This factor represents consumer perceptions of e-advertising's innovative technology appeal.

Factor 2 accounts for 21.488% of the variance and loads most strongly (0.926 or higher) on 'Informative', 'Trust' and 'Customer satisfaction'. This factor captures consumer perceptions of e-advertising's ability to deliver positive customer experiences.

Factor 3 explains 16.206% of the variance and loads highly (0.912 or greater) on 'Two-way communication', 'Feedback' and 'Online assistance'. This factor represents consumer perceptions of e-advertising's interactive capabilities.

Lastly, Factor 4 explains 8.395% of the variance and loads most strongly on 'Consumer loyalty' and 'Target oriented', representing perceptions of e-advertising's cost-effectiveness.

All four factors demonstrated good reliability with Cronbach's alpha values between 0.931 and 0.982. The factor analysis confirms the hypothesised dimensions of consumer e-advertising perception, providing a valid framework for further analysis. Marketers can leverage these insights to refine e-advertising strategies for more significant innovation, customer experience, interactivity and cost-effectiveness.

The factor analysis supports the scale's construct validity by revealing the underlying factor's structure aligned with theoretical concepts. The reliability analysis indicates that consumers perceive e-advertising as favourably delivering innovative technology, customer experience, interactivity and cost-effectiveness.

# 4.3 Benefits of e-advertising concerning 4 P's of marketing

The variables related to the Benefits of E-Advertising concerning the 4 P's of Marketing were recorded, and appropriate statistics were employed to extract important factors further to be used for SEM Analysis and model testing.

Table 4 displays the descriptive statistics and reliability analysis for the 18-item scale assessing e-advertising's benefits with respect to the 4Ps of marketing (product, price, place and promotion).

No.	T.	14	G D	Communality		Alpha if item
	Items	Mean	S.D.	Initial	Final	deleted
Pr1	Product information	6.11	1.019	1.00	0.754	0.836
Pr2	Product placement	6.31	1.011	1.00	0.860	0.841
Pr3	Product design	6.13	0.978	1.00	0.775	0.843
Pc1	Customer specification	6.18	1.143	1.00	0.665	0.846
Pc2	Cost of the product	6.09	0.985	1.00	0.938	0.815
Pc3	Demand of the product	5.97	1.015	1.00	0.820	0.839
Pc4	Competitive price	5.95	1.129	1.00	0.775	0.879
Pc5	Government regulation	5.96	1.179	1.00	0.760	0.866
Pc6	Additional expenses	6.15	1.137	1.00	0.715	0.823
P11	Right location	5.77	0.928	1.00	0.648	0.847
Pl2	Quick linkage	5.99	0.986	1.00	0.792	0.850
P13	Possession	6.31	1.211	1.00	0.839	0.843
Pl4	Channel levels	6.13	0.939	1.00	0.752	0.850
P15	Transportation	6.31	1.113	1.00	0.818	0.829
Pm1	Target customer	6.19	0.847	1.00	0.671	0.836
Pm2	Promotion campaign	6.19	0.959	1.00	0.637	0.849
Pm3	Credibility	6.91	1.312	1.00	0.826	0.842
Pm4	Brand recognition	6.18	1.129	1.00	0.673	0.813

Table 4Descriptive statistics and scale reliability analysis (benefits of e-advertising with<br/>respect to 4 P's of marketing)

Notes: Items = 18, Mean = 6.08, Minimum = 5.77, Maximum = 6.91;

Alpha value = 0.847, Lowest communality = 0.637, Highest communality = 0.938.

The items have high-mean scores from 5.77 to 6.91 on a 7-point scale, indicating respondents perceived substantial e-advertising benefits across all 4Ps components. Standard deviations ranged from 0.847 to 1.312, showing some variation in responses.

All items display strong initial communalities of 1.0, while the final lowest communality value is 0.637 and the highest is 0.938, demonstrating that each item measures the underlying construct of e-advertising's marketing mix benefits well. The overall Cronbach's alpha for the scale is 0.847, exceeding the recommended 0.7 threshold and evidencing high-internal reliability.

The 'alpha if item deleted' values show minimal alpha improvements if any one item is removed, with the lowest being 0.815 for the price item 'Cost of the product'. This signifies that all scale items contribute meaningfully to measuring e-advertising's marketing mix benefits.

Therefore, respondents perceive e-advertising as delivering significant benefits across product innovation, pricing, place and promotion activities, as reflected by the elevated mean scores. The strong communalities and high Cronbach's alpha values affirm construct validity and scale reliability.

Marketers can leverage these findings to justify more significant investments in eadvertising platforms and tools due to their capabilities to drive substantial improvements across marketing mix elements. The scale provides a robust instrument for analysing linkages between e-advertising innovation/cost-effectiveness and marketing mix benefits, specifically for enhancing organisational competitiveness through cost efficiencies.

The results establish a firm measurement foundation and provide empirical evidence that e-advertising confers multifaceted benefits spanning the marketing mix. Marketers should consider integrating e-advertising holistically across the 4Ps activities to maximise its advantages for product enhancement, pricing flexibility, market access and promotional productivity.

Table 5 displays the factor analysis conducted on the 18 e-advertising marketing mix benefits items to identify the underlying dimensions. Principal component analysis with varimax rotation extracted four factors explaining 72.24% of the variance.

No.	Items	Product	Price	Place	Promotion
Pr1	Product information	0.835			
Pr2	Product placement	0.811			
Pr3	Product design	0.824			
Pc1	Customer specification		0.792		
Pc2	Cost of the product		0.767		
Pc3	Demand of the product		0.786		
Pc4	Competitive price		0.712		
Pc5	Government regulation		0.835		
Pc6	Additional expenses		0.833		
P11	Right location			0.905	
P12	Quick linkage			0.910	
P13	Possession			0.889	
Pl4	Channel levels			0.855	
P15	Transportation			0.816	
Pm1	Target customer				0.822
Pm2	Promotion campaign				0.778
Pm3	Credibility				0.780
Pm4	Brand recognition				0.763
	Eigenvalue	5.214	4.278	3.211	1.579
	Alpha value	0.845	0.831	0.855	0.849
	Percentage variance (72.24%)	25.221%	22.418%	15.206%	10.0%

 Table 5
 Factor analysis (benefits of e-advertising with respect to 4 P's of marketing)

Notes: KMO = 0.855, Bartlett's test of Sphericity ( $\chi 2$ ) = 5223.631, DF = 97, Sig. = 0.000.

Factor 1 accounts for 25.221% of the variance and loads strongly (0.811 to 0.835) on the 'Product information', 'Product placement', 'Product design' and other product-related items. This factor represents e-advertising's benefits for product innovation.

Factor 2 accounts for 22.418% of the variance and loads most strongly on 'Government Expenditure', 'Additional Expenses' and other pricing items, reflecting e-advertising's pricing advantages.

Factor 3 explains 15.206% of the variance and loads highly (0.905 or greater) on the 'Right location', 'Quick linkage' and other place-related items. This factor captures e-advertising's place benefits for distribution and market access.

Factor 4 represents e-advertising's price benefits, explaining 10.25% of the variance and loading strongly (0.780 or higher) on 'Target customer', 'Promotion campaign' and other promotion-oriented items.

All four factors were reliable, with Cronbach's alpha values from 0.831 to 0.855. The factor analysis reveals the underlying dimensions of e-advertising's marketing mix benefits aligned with the 4Ps framework. According to Hair et al. (2010), all these values are sufficient to confirm the EFA's.

These findings provide marketers with insights into e-advertising's multidimensional benefits. The productivity gains span product innovation, pricing flexibility, distribution access and promotional targeting. Marketers should integrate e-advertising throughout the marketing mix to realise these diverse benefits.

Specifically, e-advertising adoption can improve product development, optimise pricing strategies, expand market reach and enhance promotional campaigns. The scale provides a valid measurement tool for analysing the relationships between e-advertising and marketing mix components. Further analysis can quantify the impact on costs and competitive advantage.

Finally, the factor analysis confirms the theoretically established marketing mix benefit dimensions, demonstrating e-advertising's versatility in driving critical improvements across the 4Ps activities. Marketers should consider the scale's dimensions when developing holistic e-advertising platforms and strategies.

#### 4.4 Hypothesis testing using SEM analysis

Structural equation modelling (SEM) is a statistical technique that tests complex relationships between multiple variables. SEM was used in this paper to test the hypotheses of how e-advertising innovativeness and cost-effectiveness affect the four P's of marketing for cost reduction. SEM consists of two parts: a measurement model and a structural model. The measurement model specifies how the observed variables (the factors extracted from the factor analysis) measure the latent variables (the underlying constructs that are not directly measured). The structural model specifies how the latent variables are related to each other. SEM allows estimating the strength and direction of these relationships and the fit of the model to the data. SEM was chosen for this paper because it can handle multiple dependent and independent variables, test causal hypotheses, and account for measurement errors. SEM is a powerful and flexible tool for analysing complex data and testing theoretical models.

*Ho1: E*-advertising innovativeness and cost-effectiveness have a positive relationship with product orientation for cost reduction.

*Ho2: E*-advertising innovativeness and cost-effectiveness have a positive relationship with price orientation for cost reduction.

Ho3: E-advertising innovativeness and cost-effectiveness have a positive relationship with place orientation for cost reduction.

*Ho4: E-advertising innovativeness and cost-effectiveness have a positive relationship with promotion orientation for cost reduction.* 

Table 6 presents the model fit statistics for the study. The Chi-Square value is 1138.231, which indicates the discrepancy between the sample covariance matrix and the model-implied covariance matrix. The CMIN/DF value is 2.701, within the recommended range of between 1 and 5, indicating an acceptable fit.

Fit index	Guidelines (Recommended)	Model values
Chi Square		1138.231
CMIN/DF	Between 1 and 5	2.701
NFI	>0.9	.941
TLI	>0.9	.912
GFI	>0.9	.901
AGFI	>0.9	.932
RMSEA	<0.5	.043
Р	< 0.05	.000

Table 6Model fit

The NFI value is .941, above the recommended value of 0.9, indicating a good fit. The TLI value is .912, also above the recommended value of 0.9, indicating a good fit. The GFI value is .901, above the recommended value of 0.9, indicating a good fit. The AGFI value is .932, also above the recommended value of 0.9, indicating a good fit.

The RMSEA value is .043, below the recommended value of 0.5, indicating a good fit. The *p*-value is 0.000, less than the recommended value of 0.05, indicating a good fit. Overall, the model fits the data well, and the results are reliable.

Based on the information presented in the study, it can be concluded that the research hypotheses have been supported, except for H3. Specifically, the beta values indicate a significant positive association between the innovativeness and cost-effectiveness of e-advertising and the product and price components of the four P's of marketing, with a particular emphasis on cost reduction.

The beta value for H1 was 0.28 and 0.31, respectively, with a *p*-value of 0.000. This suggests a significant positive association between the innovativeness and cost-effectiveness of e-advertising and the product and price components of the four P's of marketing, with a particular emphasis on cost reduction. This finding supports the idea that innovative and cost-effective e-advertising techniques can effectively reduce the costs associated with product development and pricing.

For H2, the beta value was 0.59 and 0.40, respectively, with a *p*-value of 0.000. This indicates a significant positive association between the innovativeness and cost-effectiveness aspects of e-advertising and the price component of the four P's of marketing, with a particular emphasis on cost reduction. This finding suggests that e-advertising can be an effective tool for reducing the costs associated with pricing.

However, H3 was not supported, with a beta value of 0.36 and 0.52, respectively and a *p*-value of 0.000. This indicates that there is no strong association between the innovativeness and cost-effectiveness of e-advertising and the place component of the four P's of marketing, with a special emphasis on cost reduction. This finding suggests that e-advertising may not be as effective in reducing the costs associated with place, such as distribution and location.







Finally, for H4, the beta value was 0.51 and 0.43, respectively, with a *p*-value of 0.000. This suggests a significant positive association between the innovativeness and cost-effectiveness of e-advertising and the promotion component of the four P's of marketing, with a particular emphasis on cost reduction. This finding supports the idea that e-advertising techniques can effectively reduce the costs associated with promotion, such as advertising and sales promotion.

In summary, the beta values provide evidence of the strength and direction of the relationship between the innovativeness and cost-effectiveness of e-advertising and the various components of the four P's of marketing. Overall, the findings suggest that e-advertising can be an effective tool for reducing costs associated with product development, pricing and promotion but may not be as effective in reducing costs associated with place.

# 5 Discussion

This study aimed to investigate the relationship between e-advertising innovation/costeffectiveness and the four components of the marketing mix, with a specific focus on cost reduction implications. The results provide several notable findings that make substantial theoretical and practical contributions.

Overall, the structural equation modelling analysis reveals significant positive relationships between e-advertising capabilities and the marketing mix's product, pricing and promotion elements. This aligns with the hypothesised links proposed based on the literature review. However, the relationship between e-advertising and the place component was non-significant.

The findings indicate e-advertising can be an impactful tool for reducing costs associated with developing products, optimising pricing strategies and enhancing promotional campaigns. The positive associations for product, price and promotion demonstrate e-advertising's data-driven testing and targeting capacities allow marketers to improve decision-making, accelerate experimentation cycles and increase cost efficiencies across these activities.

However, the lack of a significant relationship for place suggests e-advertising may not directly substitute for traditional distribution and logistics considerations. Brick-andmortar location factors may limit e-advertising's ability to influence market reach and channel access costs. This highlights the need for marketers to develop integrated ecommerce and digital strategies that combine e-advertising with complementary capabilities.

The study results provide empirical evidence of e-advertising's advantages in enhancing marketing mix productivity and cost competitiveness. However, fully capitalising on e-advertising requires aligning it strategically with other resources rather than viewing it as a direct replacement.

The findings make several theoretical contributions. Firstly, the research responds to scholars like Keller (2009) calling for a more holistic examination of e-advertising across the marketing mix. Secondly, it affirms and quantifies the competitive resources and capabilities afforded by e-advertising, as highlighted by strategic management literature (Barney, 1991).

Finally, the study addresses a significant literature gap regarding the empirical assessment of e-advertising's multifaceted marketing mix impacts and cost reduction potential (Zhang and Feng, 2011).

The results offer vital data for practice to inform e-advertising investment and integration decisions across marketing functions. Managers can leverage the findings to focus spending on activities where e-advertising demonstrates significant cost advantages while pursuing alternative solutions for capabilities not directly enhanced by e-advertising.

# 6 Managerial implications

The findings from this study offer several critical managerial implications for how companies can leverage e-advertising to reinforce competitiveness in the marketplace. As digital marketing grows, executives must understand how to utilise these tools for cost-

effective promotion. Analysing the four P's of marketing provides actionable insights for management across product, pricing, place and promotion domains.

# 6.1 Enhancing product strategy

The results reveal a significant relationship between e-advertising innovativeness/costeffectiveness and the product component of the marketing mix. This suggests that e-advertising can be an impactful tool for reducing product research, design and testing costs. Specific implications include:

- Utilising online focus groups and social listening for rapid product concept feedback at a fraction of traditional research costs. Viral product unveilings can also generate valuable buzz.
- Leveraging digital rendering and simulation tools to iterate product aesthetics and ergonomics faster and without physical prototypes.
- Running A/B tests on product website pages to optimise conversion rates for the lowest customer acquisition cost.
- Driving pre-orders and crowdfunding through targeted product launch campaigns to validate demand and improve forecasting accuracy.
- Personalising product configurations or service bundles based on website behaviour data to boost uptake.

With thoughtful implementation, executives can drive material savings in product development and launch budgets via e-advertising while accelerating speed-to-market.

# 6.2 Optimising pricing approaches

The study also found a significant link between e-advertising and pricing, underscoring how digital targeting and optimisation can improve price-setting strategies. Specific implications include:

- Running multivariate testing on offer messaging and webpage pricing displays to maximise conversion at various price points.
- Leveraging geo-targeted campaigns to test and adjust pricing across geographic customer segments.
- Using online auctions, flash sales and dynamic pricing algorithms to respond rapidly to demand shifts.
- Analysing web traffic behaviours to optimise cross-sell and upsell offers at a granular segment level.
- Automating rollout of short-term promotions based on site traffic triggering to spur impulse purchases.

With robust experimentation, firms can rapidly fine-tune pricing tactics for improved profitability. E-advertising provides the nimbleness to adapt pricing approaches on-the-fly.

# 6.3 Reinforcing distribution and market access

While the study did not find a strong direct link between e-advertising innovativeness/ cost-effectiveness and place, digital marketing can still play an important role in distribution and market access. Relevant implications include:

- Using geofencing and location-based mobile ads to drive foot traffic to physical outlets cost-effectively.
- Building partnerships with e-retailers and comparison sites to expand market reach rapidly.
- Using influencer campaigns to penetrate niche geographical and cultural segments without brick-and-mortar investments.
- Optimising delivery promise messaging in campaigns to balance speed and cost profitably.
- Analysing digital behavioural data to optimise locations of experiential pop-ups and tasting events.

Though the place implications are less direct, thoughtful omnichannel coordination allows e-advertising to enhance distribution efficiency. Location analytics and digitalphysical synergies are key.

# 6.4 Improving promotional efficiency

Finally, the analysis confirmed a significant association between e-advertising and promotion, suggesting digital tools can significantly enhance promotional ROI. Specific implications include:

- Capitalising on audience insights for highly targeted ad campaigns vs. broad-based media buys.
- Split testing message copy and creatives to continuously improve campaign performance.
- Automating cross-channel nurturing programs tailored to each prospect's journey for expanded reach.
- Monitoring ROI on a per-ad, per-keyword and per-channel basis to optimise spend on what works.
- Retargeting engaged visitors with personalised content across devices and platforms.
- Using influencers and viral social campaigns to gain earned amplification at low cost.

E-advertising provides unmatched campaign optimisation and efficiency gains. By relentlessly focusing on promotion ROI, executives can stretch budgets significantly further.

#### 6.5 Competitiveness implications

Across the four P's, thoughtfully leveraging e-advertising tools can transform cost savings, speed and overall competitiveness. As consumers increasingly gravitate to digital channels, these marketing implications become imperative. Firms that lag in e-advertising sophistication risk competitive disadvantage across metrics like product development cycles, customer acquisition cost, pricing flexibility, market reach and promotional efficiency. By embracing the ever-expanding array of digital targeting, testing and optimisation capabilities, executives can gain a strong competitive edge in their industries. They can bring offerings to market faster, execute price changes nimbly, expand reach efficiently and manage promotional budgets judiciously. This study provides a strategic roadmap for leveraging e-advertising across the marketing mix to reinforce competitiveness in today's digital-first environment.

#### 7 Conclusions

In conclusion, the study's results indicate a significant relationship between the innovativeness and cost-effectiveness of e-advertising and the product and price components of the four P's of marketing, with a particular emphasis on cost reduction. The findings support the idea that innovative and cost-effective e-advertising techniques can effectively reduce the costs associated with product development and pricing. Similarly, e-advertising can effectively reduce the costs associated with promotion, such as advertising and sales promotion. However, the study did not find a strong association between the innovativeness and cost-effectiveness of e-advertising and the place component of the four P's of marketing, with a particular emphasis on cost reduction.

One possible explanation for the lack of a strong association between e-advertising and the place component of the four P's of marketing is that the physical location of a business can be a critical factor in attracting customers. While e-advertising can help increase a business's visibility, it may not be able to replace the importance of a physical location. Additionally, the costs associated with distribution and logistics may not be as quickly reduced through e-advertising as those associated with product development, pricing and promotion.

Another possible explanation for the findings is that the nature of e-advertising itself may lend itself more to certain aspects of the four P's of marketing than others. For example, the ability to easily target specific audiences through digital advertising may make it particularly effective in influencing pricing and promotion decisions. Similarly, the ability to quickly and inexpensively test new product ideas online may make e-advertising a particularly effective tool for reducing costs associated with product development.

Overall, the study provides valuable insights into the relationship between e-advertising and the four P's of marketing, with a particular emphasis on cost reduction. While the findings suggest that e-advertising can be an effective tool for reducing costs associated with product development, pricing, and promotion, the lack of a strong association between e-advertising and the place component of the four P's of marketing highlights the need for businesses to consider a range of marketing strategies to optimise their cost-saving efforts. It is important to note that the study is not without its limitations. For example, the sample used in the study was limited to a single industry, and the results may not be generalisable to other industries. Additionally, the study focused on the association between e-advertising and cost reduction and did not explore other potential benefits of e-advertising, such as increased revenue or customer engagement.

Future research could build upon these findings by exploring the relationship between e-advertising and other aspects of the four P's of marketing, such as product quality, packaging and branding. Additionally, studies could explore the effectiveness of e-advertising in reducing costs associated with different types of businesses, such as small businesses or those operating in different geographic regions.

In short, the findings of this study provide valuable insights into the relationship between e-advertising and the four P's of marketing, with a particular emphasis on cost reduction. While the study suggests that e-advertising can effectively reduce costs associated with product development, pricing and promotion, businesses should consider a range of marketing strategies to optimise their cost-saving efforts.

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# **APPENDIX:** Questionnaire

# Section 1: Demographic Profile

- 1) Gender: Male / Female/ Other
- 2) Age: Below 15 years / 15-30 years / 30-45 years / Above 45 years
- 3) Location: Punjab / Chandigarh
- 4) Occupation: Service / Business / Housewife / Student / Any other
- 5) Education Level: School / Undergraduate / Graduate / Post-graduate
- 6) Area of Residence: Urban / Rural
- 7) Monthly Household Income: Below 1,00,000 / 1,00,000 2,50,000 / 2,50,000 5,00,000 / 5,00,000 10,00,000 / Above 10,00,000
- 8) Marital Status: Married / Unmarried

#### Section 2: Perceptions of E-Advertising

On a scale of 1 to 7 where 1 = Strongly Disagree and 7 = Strongly Agree, please rate your level of agreement with the following statements:

- 9) E-advertising offers creative and engaging content.
- 10) E-advertising makes good use of multimedia images, audio, video, etc.
- 11) I find e-advertising campaigns entertaining.
- 12) E-advertising provides informative content.
- 13) I trust claims and information presented in e-ads.
- 14) E-ads positively impact my satisfaction with brands, products and services.
- 15) E-advertising enables two-way communication between brands and consumers.
- 16) E-advertising provides me the opportunity to provide feedback on brands, products and services.
- 17) E-advertising offers helpful online assistance and support for products and services.
- 18) Effective e-ads increase my loyalty towards brands.
- 19) E-advertising allows brands to target me with relevant messaging and offers.

#### Section 3: E-Advertising and the Marketing Mix

On a scale of 1 to 7 where 1 = Strongly Disagree and 7 = Strongly Agree, please rate your level of agreement with the following statements:

- 20) E-advertising provides me with useful information about product features and characteristics.
- 21) E-advertising is an effective way for brands to showcase their products.
- 22) E-ads help me understand the design aspects of products and services.
- 23) E-advertising conveys how brands meet specific customer requirements.
- 24) E-ads provide transparency on product costs and pricing.
- 25) E-advertising gives me insights into current demand for products.
- 26) I can assess competitive pricing for products and services through e-ads.
- 27) E-ads make me aware of changes in government regulations impacting products.
- 28) E-advertising reduces additional expenses associated with traditional advertising.
- 29) Location-based e-ads drive me to visit nearby physical stores and outlets.
- 30) E-advertising effectively directs me to online purchasing channels.
- 31) E-ads build perception of ownership satisfaction from using products and services.
- 32) E-advertising helps me identify the optimal distribution channel for purchases.
- 33) E-ads showcase how brands transport products to customers.
- 34) E-advertising allows brands to reach targeted customer groups.
- 35) E-advertising provides effective platforms for promotional campaigns by brands.
- 36) I perceive brands advertised through e-ads as more credible.
- 37) E-advertising increases brand awareness and recognition.