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DECISION SUPPORT MODELS FOR SELECTING ARTIFICIAL INTELLIGENCE TOOLS IN THE DESIGN OF MARKETING WEB-BASED INFORMATION AND COMMUNICATION SYSTEMS

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1. Introduction and problem statement

Under the global digitalisation of the economy the corporate website has changed its role from an auxiliary information channel into the central element of the marketing system of an enterprise. Being a digital point of contact available around the clock, the website remains the only fully controlled digital environment of a business. Unlike third-party platforms, whose rules and ranking algorithms may change without prior notice, a corporate website allows a company to shape its own brand narrative, to collect first-party data about its audience and to build long-term relations with customers, which has become critically important under the tightening of privacy regulation such as GDPR and CCPA [1; 2].

The present stage of development of internet technologies is characterised by two parallel transformation processes. The first concerns the evolution of the functional capabilities of websites themselves, from the static digital business cards of the Web 1.0 era to interactive, personalised platforms built on artificial intelligence. The second, which is unfolding at present and requires deeper scientific interpretation, concerns the change of the very paradigm of creating these digital products: the appearance of AI-based instruments fundamentally reshapes the software development lifecycle of a website, affecting productivity, the competence requirements for specialists and the strategic approaches to project delivery [8; 9; 10].

While the first transformation is comparatively well covered in the literature on digital marketing and website evaluation, the second remains insufficiently studied from the standpoint of design methodology. Design and development teams today operate in a market of AI instruments that is simultaneously large, rapidly changing and highly heterogeneous. The strategic choice between an AI code assistant embedded into a conventional engineering stack and a no-code AI builder that generates an entire website from a natural-language brief is not a purely technical one. It predetermines the cost of the project, the time to market, the achievable degree of customisation, the scalability of the resulting system, the ownership of the codebase and the cost of subsequent maintenance. In the absence of formalised decision support, this choice is made intuitively, on the basis of the personal experience of a team lead or of marketing pressure from a vendor, which regularly leads to sub-optimal technological decisions.

The purpose of this paper is to substantiate and to state formally a system of decision support models for selecting artificial intelligence tools at the stages of designing and developing marketing web-based information and communication systems (hereinafter MWICS). To achieve this purpose the following objectives are set: to delimit MWICS as an object of design; to carry out an analytical review of the existing methods of designing digital products and to identify the research gaps that they leave open; to systematise the modern AI instruments according to their role in the design and development lifecycle; to formulate a decision support model that maps a project profile onto a class of AI instruments; and to demonstrate the operation of the proposed model on illustrative project profiles.

2. Marketing web-based information and communication systems as an object of design

An accurate statement of the design problem requires a clear terminological apparatus, since the notions of a website, a web-based information system and a marketing web-based information and communication system possess different levels of abstraction and coverage, ranging from a technical object to a complex socio-technical system with a marketing orientation.

A website in the basic sense is a set of interrelated web pages placed in the Internet and accessible at a unique URL address. An information system is an automated system intended for the collection, storage, transfer and processing of information in support of the managerial or operational processes of an organisation [7]. A web-based information system is an information system that operates on the basis of web technologies and is accessible to users through a browser without the installation of separate software [6]. Finally, a marketing web-based information and communication system is understood in this study as a web-based information system of an enterprise or organisation whose functionality and content are directed at the realisation of the goals of internet marketing: attracting the target audience, forming the brand, ensuring communication with customers and supporting transactions.

MWICS is therefore a subset of web-based information systems, which in turn is a subset of information systems. In the functional dimension such systems realise informational, communicational and transactional functions [3; 4; 5], and it is precisely this class of systems that constitutes the object of the present study.

The methodological consequence of this delimitation is essential: for a MWICS a technological decision about the instruments of implementation is simultaneously a decision about the boundaries of what the marketing function of the system will be able to do. The selection of AI instruments therefore cannot be reduced to an engineering preference and requires a formalised model that accounts for the marketing and business context of the project.

3. Analytical review of design methods and the identified research gaps

The design of web-based systems covers several successive stages, from the strategic analysis of the product to the design of the information architecture, the interface and the technological stack, and at each of them the practice of digital design has accumulated a considerable arsenal of methods. The question of how far these methods correspond to the requirements of marketing systems and to the realities of the AI era, however, remains open.

At the stage of strategic product analysis the most widespread instrument is the Lean Canvas [13], which structures a business idea into nine blocks and is effective for the rapid validation of business hypotheses. It does not, however, provide for an explicit formulation of the goals of internet marketing, and it contains no mechanism for translating a business model into concrete requirements for the functionality and content of a corporate website.

At the stage of designing functionality and content the principal methods are the Feature Comparison Matrix, the Kano model [14], the method of personas [15], the formation of a minimum viable product on the basis of multi-criteria evaluation, and User Stories [16]. The first of these is retrospective in character: it records the state of the market but gives no normative model of which functions are needed to achieve a particular marketing goal. The Kano model allows priorities to be set rationally but establishes no link between website functions and marketing key performance indicators. The method of personas improves the orientation of the team towards the real user, yet remains qualitative, without formal mechanisms of translating the needs of personas into functional requirements that account for the marketing strategy of the enterprise.

At the stage of designing the information structure and the interface, User Story Mapping [17], wireframes and user flows are applied. A user story map gives a holistic view of the user journey but reflects the UX path rather than the marketing funnel of awareness, consideration, conversion and retention. Wireframes and user flows are effective UX and UI instruments, yet neither expresses a formalised relationship with internet marketing strategies, and neither covers the question of selecting the instruments of implementation. The results of the review are summarised in Table 1.

Table 1.

Analytical review of digital product design methods with respect to the requirements of MWICS

Design stage	Methods and models	Limitations with respect to MWICS
Strategic product analysis	Lean Canvas	Oriented towards start-ups; no explicit statement of internet marketing goals; no mechanism of translating the business model into requirements for website functionality and content
Design of functionality and content	Feature Comparison Matrix; Kano model; method of personas; MVP formation (S-M-L); User Story	Retrospective or purely qualitative in character; no link between website functions and marketing indicators; no formalised choice of the technological level of implementation or of the AI instruments

Design stage	Methods and models	Limitations with respect to MWICS
Design of information structure and interface	User Story Map; wireframes; user flow	Reflect the UX path rather than the marketing funnel; no formalised link with internet marketing strategies; no mechanism for selecting the instruments of development

Source: compiled by the author.

The review carried out permits the identification of two systemic gaps in the existing methodological support of MWICS design. The first gap is the absence of a formalised correspondence between the marketing strategies of an enterprise and the functional and content requirements for its website. None of the methods considered answers the question of what the minimally necessary set of functions and content of a website should be if the strategic goal of the enterprise consists, for example, in increasing the number of customers through organic search, or of how the requirements change in the transition from a strategy of acquiring new customers to a strategy of retaining existing ones.

The second gap, which is the subject of the present paper, is the absence of decision support methods for selecting the AI toolkit of design and development. None of the methods considered contains a mechanism for choosing AI instruments at the various stages of designing and building a MWICS, although the strategic choice among them exerts a substantial influence on the cost, the schedule and the quality of the final product.

4. Systematisation of AI instruments by stages of the design and development lifecycle

The market of AI instruments for web development is heterogeneous not only quantitatively: instruments nominally applied to the same task may belong to fundamentally different paradigms of interaction between the specialist and the system, since some accelerate the work of an engineer inside a conventional stack while others replace substantial parts of that stack altogether. Systematisation is therefore performed on two axes simultaneously: the lifecycle stage of application, and the class of the instrument by the character of its intervention.

Five classes of instruments are distinguished. AI code assistants operate inside the development environment of an engineer and generate, complete or refactor code while preserving the conventional technological stack and full control over the codebase. No-code and low-code AI builders generate a working web system from a natural-language description or from a visual model, radically reducing the time to the first working version at the cost of customisation depth and portability. AI instruments of design generate or transform interface layouts, design systems and visual assets. AI instruments of content generation produce and localise textual, visual and metadata content, which for a MWICS is not an auxiliary but a core marketing function. AI instruments of quality assurance generate test scenarios, perform automated regression checks and detect accessibility and performance defects.

Table 2.

Systematisation of classes of AI instruments by stages of the MWICS lifecycle

Class of instruments	Lifecycle stages of principal application	Effect obtained	Principal risk
AI code assistants	Implementation, refactoring, technical documentation	Acceleration of routine coding; lower entry threshold for unfamiliar parts of the stack	Uneven quality of generated code; hidden defects; dependence on the reviewer competence
No-code and low-code AI builders	Prototyping, implementation of the first release, content operations	Radical reduction of time to the first working version and of the delivery cost	Limited customisation; vendor lock-in; restricted scalability and data portability
AI instruments of design	Design of the information structure and the interface	Fast generation of layout variants and of a consistent design system	Visual uniformity; weak connection with the marketing funnel of the specific business
AI instruments of content generation	Design of content, launch and ongoing marketing operations	Scaling of content production and localisation; support of SEO operations	Loss of brand voice; risk of factual errors; search engine quality policies
AI instruments of quality assurance	Testing, release preparation, operation	Broader regression coverage; earlier detection of accessibility and performance defects	False confidence in coverage; limited value for business logic verification

Source: compiled by the author.

Of these five classes, two form the strategic poles of the decision and therefore require particular attention in the model proposed below. AI code assistants preserve the conventional engineering path and shift the trade-off towards customisation, scalability and long-term ownership, at the price of a higher initial cost and a longer schedule. Empirical evidence indicates a measurable increase in the productivity of engineering teams from the use of such assistants [11; 12], although the reported magnitude of that gain varies considerably with the type of task. No-code AI builders shift the trade-off in the opposite direction: they minimise the time and the cost of reaching a working system while limiting the depth of customisation, the integration capability and the portability of the result. Between these two poles there is a hybrid approach, in which a builder platform carries the standard part of the system while the business-critical modules are implemented in a conventional stack. The practical problem consists in determining, for a given project, which of the three configurations is preferable, and in doing so on the basis of reproducible criteria rather than intuition.

5. The decision support model for selecting AI instruments

The proposed model formalises the selection of a class of AI instruments as a problem of matching the profile of a project with the reference profiles of the alternatives in a normalised space of criteria. Let E be the set of stages of the design and development lifecycle of a MWICS, and let A be the set of alternative classes of AI instruments considered for the project as a whole. Let C be an ordered set of n criteria characterising both the project and the alternatives.

The project under design is described by a profile vector, in which every component is the normalised value of the corresponding criterion:

$$P = (p1, p2, ..., pn),\ \ pj \in [0, 1],\ \ j = 1, ..., n \qquad (1)$$

Every alternative class of instruments is described by a reference profile, that is, by the configuration of project characteristics for which this class is the most appropriate:

$$R(ak) = (r1k, r2k, ..., rnk),\ \ rjk \in [0, 1],\ \ ak \in A \qquad (2)$$

The relative importance of the criteria is established by the analytic hierarchy process [18]. Experts fill a matrix of pairwise comparisons of the criteria on the fundamental scale, the vector of weights is obtained as the normalised principal eigenvector of that matrix, and the result is accepted only if the consistency ratio does not exceed 0.1. The weights obtained satisfy the normalisation condition that their sum equals unity.

The degree of correspondence between the project and an alternative is measured by the weighted Euclidean distance in the space of criteria:

$$d(P, R(ak)) = \sqrt{\left(\Sigma\, wj \cdot (pj - rjk)^2 \right)},\ \ j = 1, ..., n \qquad (3)$$

The recommended class of instruments is the alternative that minimises this distance:

$$a^* = \arg\min d(P, R(ak)),\ \ ak \in A \qquad (4)$$

An important property of the model is that it does not force a categorical choice where the input data do not justify one. If the distances to the two best alternatives differ by less than a threshold value, the model returns a recommendation of a hybrid configuration instead of a single class:

$$\text{if } |\, d(P, R(a(1))) - d(P, R(a(2)))\, | \le \varepsilon \ \text{ then } \ a^* = hybrid \qquad (5)$$

where a(1) and a(2) denote the two alternatives with the smallest distances and the threshold is set by the expert group, with a value of 0.05 used in the calculations below. This rule protects the model against spurious precision: in a substantial part of real projects the difference between the strategies is genuinely small, and an honest recommendation in such a case is a combined configuration rather than an arbitrary preference.

The second component of the model operates at the level of the individual lifecycle stage: for every pair of a stage and a class of instruments an expert suitability estimate is formed, and the recommendation for the stage maximises the product of that estimate and the global correspondence of the alternative to the project profile. This yields a differentiated recommendation, in which, for example, content generation instruments are advised for the content stage even when the architecture as a whole is built with a conventional stack.

Table 3.

Criteria of the model and reference profiles of the alternatives

Criterion (a high value means)	Weight wj	No-code AI builder	AI code assistant	Hybrid configuration
c1. Available budget (not constrained)	0.10	0.2	0.8	0.5
c2. Time pressure (launch date is critical)	0.12	0.9	0.3	0.6
c3. Functional complexity (non-standard logic)	0.18	0.2	0.9	0.6
c4. Customisation requirement (unique experience)	0.15	0.2	0.9	0.6
c5. Scalability horizon (growth of load expected)	0.14	0.2	0.9	0.6
c6. Engineering competence (mature in-house team)	0.13	0.2	0.9	0.6
c7. Integration requirements (many external systems)	0.10	0.2	0.9	0.6
c8. Content volatility (frequent marketing updates)	0.08	0.8	0.4	0.6

Source: compiled by the author. Weights are obtained by the analytic hierarchy process; reference profiles are formed by expert evaluation.

6. Illustrative application of the model

The operation of the model is demonstrated on three project profiles that represent typical situations in the practice of designing marketing web-based systems.

The first profile, P1 = (0.3; 0.8; 0.3; 0.3; 0.3; 0.3; 0.2; 0.7), corresponds to a small enterprise that requires a lead-generating marketing website with a tight launch deadline, a limited budget, standard business logic and frequent content updates performed by the marketing team itself. The second, P2 = (0.8; 0.4; 0.9; 0.8; 0.9; 0.8; 0.9; 0.5), corresponds to a large transactional MWICS with complex business logic, numerous external integrations, substantial expected growth of load and a mature in-house engineering team. The third, P3 = (0.5; 0.6; 0.6; 0.5; 0.6; 0.5; 0.5; 0.7), corresponds to a medium-sized content and communication platform of an online education provider, with moderate values on most criteria and an elevated volatility of content.

Table 4.
Results of applying the model to the illustrative project profiles

Project profile	d to no-code builder	d to code assistant	d to hybrid	Model recommendation
P1. Lead-generating website of a small enterprise	0.095	0.572	0.282	No-code AI builder
P2. Large transactional MWICS	0.616	0.069	0.252	AI code assistant with a conventional stack
P3. Content platform of an education provider	0.326	0.341	0.068	Hybrid configuration

Source: calculated by the author according to formulas (1)-(5).

The results are interpretable and correspond to the professional intuition of experienced teams, which is a necessary although not sufficient condition of validity. For P1 the distance to the no-code builder is roughly six times smaller than to the code assistant; for P2 the relation is inverted with a comparable margin. P3 is the methodologically interesting case: the two pure strategies are almost equidistant, differing by 0.015, which is below the threshold, while the hybrid configuration is markedly closer to the project profile. A model that returned a single pure strategy here would be producing an artefact of rounding rather than a decision.

The value of the model is not that it replaces the judgement of the design team, but that it makes the structure of that judgement explicit and reproducible. The weights of the criteria and the reference profiles are stated openly and can be discussed, challenged and adjusted for a particular organisation, whereas an intuitive decision leaves no such surface for verification.

7. Conclusions

The study permits the following conclusions. First, marketing web-based information and communication systems constitute a distinct class of design objects for which a technological decision about the instruments of implementation is simultaneously a decision about the boundaries of the marketing capability of the system, which makes an engineering-only treatment of the instrument choice inadequate.

Second, the analytical review of the established methods of designing digital products shows that all of them, while well developed within their own domains, leave two systemic gaps with respect to MWICS: the absence of a formalised correspondence between marketing strategies and functional requirements, and the absence of decision support for the selection of the AI toolkit of design and development.

Third, the modern AI instruments of web development may be systematised into five classes according to the character of their intervention in the lifecycle, of which no-code AI builders and AI code assistants form the strategic poles of the decision, with a hybrid configuration between them.

Fourth, the proposed decision support model formalises the selection of a class of instruments as the minimisation of a weighted Euclidean distance between the normalised profile of the project and the reference profiles of the alternatives, with the weights of the criteria obtained by the analytic hierarchy process and with an explicit threshold rule that returns a hybrid recommendation when the pure strategies are not distinguishable by the input data.

Fifth, the illustrative application of the model to three typical project profiles produces interpretable recommendations and demonstrates the practical value of the threshold rule for the intermediate case.

The directions of further research consist in the empirical validation of the reference profiles and the criteria weights on a sample of completed web projects, in the extension of the model to the stage level with a full suitability matrix, and in the integration of the proposed model with the model of correspondence between marketing strategies and website functionality, which together are intended to form an integral information technology of designing marketing web-based information and communication systems.

References

1. Kotler P., Kartajaya H., Setiawan I. Marketing 5.0: Technology for Humanity. Hoboken: John Wiley & Sons, 2021. 206 p. ISBN 978-1-119-66851-0.

2. Kannan P. K., Li H. Digital marketing: A framework, review and research agenda. International Journal of Research in Marketing. 2017. Vol. 34, No. 1. P. 22-45. DOI: https://doi.org/10.1016/j.ijresmar.2016.11.006

3. Hoekstra J., Huizingh E., Bijmolt T., Krawczyk A. Providing information and enabling transactions: Which website function is more important for success? Journal of Electronic Commerce Research. 2015. Vol. 16, No. 2. P. 81-94.

4. Karray S., Sigue S. P. Informational and/or transactional websites: Strategic choices in a distribution channel. Electronic Commerce Research and Applications. 2018. Vol. 27. P. 11-22. DOI: https://doi.org/10.1016/j.elerap.2017.11.001

5. Karpii O. P., Vynohradska Yu. A. Website of an enterprise as a means of managing marketing activity. Naukovi zapysky Lvivskoho universytetu biznesu ta prava. 2022. No. 34. P. 213-219. DOI: https://doi.org/10.5281/zenodo.7299732

6. Murugesan S., Deshpande Y., Hansen S., Ginige A. Web Engineering: a New Discipline for Development of Web-Based Systems. Lecture Notes in Computer Science. Berlin, Heidelberg: Springer, 2001. Vol. 2016. P. 3-13. DOI: https://doi.org/10.1007/3-540-45144-7_2

7. Laudon K. C., Laudon J. P. Management Information Systems: Managing the Digital Firm. 17th ed. Harlow: Pearson, 2021.

8. Hymel C. The AI-Native Software Development Lifecycle: A Theoretical and Practical New Methodology. arXiv preprint arXiv:2408.03416. 2024. URL: https://arxiv.org/abs/2408.03416

9. Terragni V., Roop P., Blincoe K. The Future of Software Engineering in an AI-Driven World. arXiv preprint arXiv:2406.07737. 2024. URL: https://arxiv.org/abs/2406.07737

10. Dohmke T., Iansiti M., Richards G. Sea Change in Software Development: Economic and Productivity Analysis of the AI-Powered Developer Lifecycle. arXiv preprint arXiv:2306.15033. 2023. URL: https://arxiv.org/abs/2306.15033

11. Cavalcante S., Ribeiro E., Oran A. The Impact of AI Tools on Software Development: A Case Study with GitHub Copilot and Other AI Assistants. Proceedings of the 27th International Conference on Enterprise Information Systems (ICEIS 2025). SCITEPRESS, 2025. Vol. 2. P. 245-252. DOI: https://doi.org/10.5220/0013294700003929

12. Gao Y. Research: Quantifying GitHub Copilot's impact in the enterprise with Accenture. GitHub Blog, 13 May 2024. URL: https://github.blog/news-insights/research/research-quantifying-github-copilots-impact-in-the-enterprise-with-accenture/

13. Maurya A. Running Lean: Iterate from Plan A to a Plan That Works. 2nd ed. Sebastopol: O'Reilly Media, 2012.

14. Kano N., Seraku N., Takahashi F., Tsuji S. Attractive quality and must-be quality. Journal of the Japanese Society for Quality Control. 1984. Vol. 14, No. 2. P. 39-48.

15. Cooper A. The Inmates Are Running the Asylum: Why High-Tech Products Drive Us Crazy and How to Restore the Sanity. Indianapolis: Sams Publishing, 1999.

16. Cohn M. User Stories Applied: For Agile Software Development. Boston: Addison-Wesley, 2004.

17. Patton J. User Story Mapping: Discover the Whole Story, Build the Right Product. Sebastopol: O'Reilly Media, 2014.

18. Saaty T. L. The Analytic Hierarchy Process: Planning, Priority Setting, Resource Allocation. New York: McGraw-Hill, 1980.

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