

PHILOSOPHICAL ANTHROPOLOGY, PHILOSOPHY OF CULTURE



UDC 7.05; 655

Original Theoretical Research

<https://doi.org/10.23947/2414-1143-2025-11-1-47-52>



Ecological Paradigm of Print Product Design

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Abstract

Introduction. In today's world, the issues of ecology and sustainable development are becoming more and more relevant. One of the areas where these problems can be successfully solved is the design of printing products. The urgency of this topic has determined the purpose of the study, which consists in the analysis of specific design approaches in the greening of polygraphic production. Taking into account the growing interest of society and state structures in environmental efficiency in various production sectors, the study of environmental principles in printing becomes not only an aesthetic, but also a socio-cultural, economic and technological trend of modern communicative design.

Materials and Methods. The material for this study was the latest scientific developments in the field of printing production, which opened up new opportunities for saving material resources, achieving an optimal ratio of costs and durability of products, the development of new materials and technologies that reduce environmental damage. The basic method was bibliographic research. The implementation of the stated goal was also based on the method of analysis of formal and stylistic features of objects of design of polygraphic products in the context of the formation of new aesthetics and digitalisation of the design process.

Results. Approaches to optimisation of printing production from the point of view of its ecological efficiency are studied. The ways of minimising harmful effects on the environment at the stages of design and manufacturing of printing objects are considered. Specific design methods of saving materials to ensure ecological circulation, reducing the toxicity of polygraphic production, introducing interactive technologies and style approaches to the artistic design of book publications in the context of environmental issues are described. Some of these methods contradict the usual traditions of printing design and even the accepted regulatory requirements, but from the point of view of the environmental agenda they represent innovative technologies. The experience of these innovations forms a new ecological culture of society.

Discussion and Conclusion. Ecological design in printing production plays an important role in creating a sustainable and socially responsible industry. The development of this area requires joint efforts on the part of producers, designers, consumers and government agencies in order to create a healthier and safer environment for human civilisation. Using specific methods and tools, design becomes a driver for the formation of environmental culture and a factor of environmental safety of society.

Keywords: ecological efficiency, sustainable development, ecocentric consciousness, ecological design, polygraphic production

For Citation. Berdnik T.O., Dorokhina I.V. Ecological paradigm of print product design. *Science Almanac of Black Sea Region Countries*. 2025;11(1):47–52. <https://doi.org/10.23947/2414-1143-2025-11-1-47-52>

Экологическая парадигма дизайна полиграфической продукции

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Аннотация

Введение. В современном мире вопросы экологии и устойчивого развития становятся все более актуальными. Одной из областей, где эти проблемы могут быть успешно решены, является дизайн полиграфической продукции. Острота данной тематики определила цель исследования, состоящую в анализе специфических дизайнерских подходов в экологизации полиграфического производства. С учетом возрастающего интереса общества и государственных структур к экологической эффективности в различных производственных отраслях исследование экологических принципов в полиграфии становится не только эстетическим, но и социокультурным, экономическим, технологическим трендом современного коммуникативного дизайна.

Материалы и методы. Материалом для данного исследования послужили новейшие научные разработки в сфере полиграфического производства, открывшие новые возможности для экономии материальных ресурсов, достижения оптимального соотношения затрат и долговечности изделий, разработки новых материалов и технологий, снижающих вред окружающей среде. Базовым методом стало библиографическое исследование. Реализация заявленной цели базировалась также на методе анализа формально-стилевых особенностей объектов дизайна полиграфической продукции в контексте формирования новой эстетики и цифровизации дизайнерского процесса.

Результаты исследования. Исследованы подходы к оптимизации полиграфического производства с точки зрения его экологической эффективности. Рассмотрены пути минимизации вредных воздействий на окружающую среду на этапах проектирования и изготовления объектов полиграфии. Описаны специфические дизайнерские методы экономии материалов для обеспечения экологического тиража, снижения токсичности производства полиграфической продукции, внедрения интерактивных технологий и стиливых подходов к художественному оформлению книжных изданий в контексте экологической проблематики. Некоторые из этих методов противостоят привычным традициям полиграфического дизайна и даже принятым нормативным требованиям, но с точки зрения экологической повестки представляют собой инновационные технологии. Опыт этих инноваций формирует новую экологическую культуру общества.

Обсуждение и заключение. Экологический дизайн в полиграфическом производстве играет важную роль в создании устойчивой и социально ответственной индустрии. Развитие данного направления требует совместных усилий со стороны производителей, дизайнеров, потребителей и государственных структур с целью создания более здоровой и безопасной среды для человеческой цивилизации. Используя специфические методы и инструменты, дизайн становится драйвером формирования экологической культуры и фактором экологической безопасности общества.

Ключевые слова: экологическая эффективность, устойчивое развитие, экоцентрическое сознание, экологический дизайн, полиграфическое производство

Для цитирования. Бердник Т.О., Дорохина И.В. Экологическая парадигма дизайна полиграфической продукции. *Научный альманах стран Причерноморья*. 2025;11(1):47–52. <https://doi.org/10.23947/2414-1143-2025-11-1-47-52>

Introduction. The social problems of today's reality are connected with changes in values, thinking and human attitude to the surrounding world. Successfully developing environmental education stimulates ecocentric consciousness and becomes an effective motivational factor of moderate consumption. The formation of new ecological habits in the social and personal sphere can become a positive result of this intension. Ecodesign is now considered as a factor in the development of modern aesthetics, which indicates its importance in the context of contemporary design practices.

For the first time mankind faced the problems of preserving natural resources in the second half of the 19th century, when, as a result of the scientific and technological revolution, the method of production of consumer goods fundamentally changed and manual labour was replaced by machine industry. The term 'ecology' and the essence of this scientific direction were first formulated by the German naturalist Ernst Haeckel in 1869 [1].

However, the ecological paradigm did not become a sustainable agenda of social consciousness until a century later. Since design as an activity reflects all social concepts, ecological consciousness in this period became an integral part of design thinking. There is even a special direction in art and design culture calling ecological design.

Most researchers attribute the origin of the phenomenon of ecological design to the 70s of the 20th century. The main idea of this phenomenon is to achieve harmonious relations of the main components of the system ‘man – environment’ as a response to the objective challenges of the gaining momentum of the scientific and technological revolution [1]. Ecologisation of scientific knowledge in design activity implies the active influence of design on the ecological safety of human civilisation. Design is able to solve a set of problems, including such aspects as saving materials and natural resources, the optimal ratio of costs for the production of the product, its durability and ergonomics, orientation on the use of materials and technologies that are safe for the environment [2].

In this context, the main vector of ecological design development is the emphasis on the product at all stages of its life cycle from the design idea to production realisation and further utilisation [3, 4]. The reality of such a task is ensured by the relationship between design and innovative scientific developments in the field of creating new materials and resource-saving technologies.

Design is one of the most multidisciplinary areas of creative activity. Each direction covers its own consumer zones, relies on specific production technologies, and has its own instruments of influence on social development and public consciousness. One of the missions of design activity is the solution of artistic tasks with the aim of artification of human life. However, the solution of this task is inextricably linked to the production realisation of the designer’s artistic intention [5]. Therefore, design practices a multilevel approach to environmental issues, on the one hand, in the context of communicative function of environmental education and, on the other hand, technological improvement of production, [5; 6].

Due to the topicality of the topic, many theorists and practicing designers study specific methods and approaches to solving ecological problems. At the same time, ecological concepts in the narrow sphere of polygraphic product design have not yet received enough attention. Therefore, the purpose of this study was to analyse the resources of environmental efficiency in the design of polygraphic objects.

Materials and Methods. In order to realise the research objective, the main method of bibliographic analysis was used, the essence of which consists in working with published information sources, their study and interpretation. A number of scientific works devoted to the essence of the problem under study were analysed, the information was systematised, and the author’s point of view on specific design tools of ecological improvement of printing production through the implementation of design tasks was formed.

The research materials were scientific works of environmental scientists, cultural scientists, art critics and designers. The criteria for selecting sources for analysis were such factors as relevance and innovativeness of information, its theoretical and practical significance, the author’s practical experience in design activity of the researched area.

Results. Ecological design in printing is an important area that aims to normalise the relationship between humans and the environment. A special approach to the layout of print publications, the use of ecological materials in production, the reduction of emissions, the use of zero-waste production, the introduction of recycling: all these measures play a key role in creating a more sustainable and environmentally friendly printing industry.

As applied to the printing industry, sustainability implies taking into account the principles of environmental protection and minimising the harmful impact on it at all stages of design, production and ‘life’.

The evolution of the concept of ‘ecological design’ in printing has its own history and is closely connected with the development of modern design trends. One of the key aspects of this evolution is the transition from classical design approaches to modern trends.

The use of ‘ecological’ paper is becoming a topical trend in printing art. It is known that the most toxic process of paper production is bleaching. It is impossible in printing to completely abandon bright white paper, which is an ideal background for placing text and illustrations. But there are interesting examples of the deliberate use of kraft paper with low toxicity in its production.

A kind of manifesto of ecological culture is a series of books for children, designed and developed by German artist Kathrin Wiele. These books are a harmonious symbiosis of content and form. Telling young readers stories about ecosystems and habitats of living creatures and plants, the books also formally correspond to ecological themes; they are printed on unbleached kraft cardboard with non-toxic colours, as close as possible to natural shades [7]. In this way the designer contributed to the environmental education of children. The example rather belongs to the exceptions. Kraft paper is more often used for technical printing products. But this experience can be the beginning of the formation of a new aesthetic concept.

The most important aesthetic component of a print product is colour. A step in the direction of ecological trends was a move away from treating colour as a design tool that serves only as a bright signal to attract the attention of the potential consumer. Often, in an effort to achieve the status of ‘eco-friendliness’, designers chose a certain colour scheme, which was associated with natural colours and could testify to the naturalness of the product. This approach is a substitution of the true ecological solution of the design problem by a purely external formal manifestation [8].

The essence of eco-efficiency in print design implies the use of safe colours. And safety is understood as both harmless contact of the consumer with the printing product and production technologies that do not damage natural resources.

Another modern design concept at the intersection of the aesthetic function, which is responsible for the external attractiveness of the product, and the communicative function, which forms the environmental awareness of the consumer, is the preference for minimalism in the design of printing objects. This style trend in design is becoming more and more in demand. Increased decorativeness, excessive details and graphic elements, popular in graphic design of the twentieth century, are replaced by the aesthetics of laconic form and strict graphic colouristic solution with a predominantly white background [9; 10]. This trend is characteristic of almost all polygraphic products: labels, posters, packaging, multi-page publications, etc.

Minimalism, as a popular stylistic trend in design, turns out to be associated with moderate ecological consumption, and, in addition, leads to minimal use of potentially environmentally harmful dyes and other toxic substances of printing production (solvents, films, etc.).

All polygraphic products, being the objects of graphic design, serve for effective transmission of useful information. Modern digital technologies help to resolve the contradiction between the aesthetics of minimalism and the completeness of communicative task fulfilment. A common situation today is the use of interactive tools [11].

Thus, the practice of placing QR codes makes it possible to significantly reduce descriptions and, therefore, the resources used, while providing all the necessary information about the product and creating a unique experience of interaction between the consumer and the brand. It is possible to get access to additional information about the origin of the product, multimedia presentation, recipes of use, etc. by QR code. By its means it is possible to attract the consumer to interact with the brand by inviting him to participate in some action and social survey [11].

Some brands also have experience in incorporating augmented reality technologies into print products. With AR-enabled applications, consumers can see virtual elements such as 3D product models or interactive instructions. 'Smart labels equipped with Radio-frequency identification (RFID) chips and sensors are an innovative solution that is becoming increasingly popular in the logistics world. These labels are transforming the way products are tracked and managed, providing valuable benefits to businesses and consumers [12].

In the heterogeneous family of print design activities, the highest priority is publishing. In the design and production of multi-page book editions, three main stages stand out - design layout, prepress and printing. In all these stages, successful steps are possible to ensure sustainable print runs.

First of all, as part of the pre-project analysis, the publisher determines the technical parameters of the book. At this stage, characteristics that may affect the environmental performance of the product are considered. The terms of reference determine the size of the book, the volume of the publication (number of sheets), the text layout, the design of headers, footers, the number of colours used in printing, and the quality of the cover or binding. It also determines the size of the page and margins.

Reducing the size of margins is one of the possible steps of greening a publication, as it leads to a reduction in the volume of the book and thus to saving resources. The Russian book publishing house Ad Marginem uses its original system of margins in its own publications. This system contradicts State Standard 5773–90, which contains requirements for the layout of books. According to the standard, the outer margins should be larger than the inner margins. However, publishers slightly violate the standard of the book structure and use small outer margins, slightly increasing the inner ones. This has a positive effect both on the convenience for the reader, as it is not necessary to open the book much to read the text 'inside', and on the economy of paper, as the margins are used more rationally [13].

The font choice also affects the overall size of the book, because depending on the typeface chosen for the text, the capacity of the information on the page can vary. The Dutch company SPRANQ set out to develop a font that would fulfil the requirements of text legibility and economical ink consumption. The result was the Ecofont programme, which processes familiar fonts (Arial, Verdana, Times New Roman), leaving unprintable fragments in the letters. For this development in 2010, the Ecofont programme received the European Award for Ecological Design [14].

In order to reduce wasted materials, some publishers recommend modernising the structure of the book by using a multi-column layout (which allows more text to be placed on a page), reducing or restructuring the header, eliminating the use of footers where possible, and relying predominantly on white for the cover.

These proposals are controversial from the point of view of the classical approach to book design, but, nevertheless, their application can indeed significantly reduce the amount of paper, inks, and other materials used in book production without compromising the convenience and aesthetics of the publication. Greening in printing is becoming an influential trend, which can significantly modernise the standards of book design and start the process of redesigning the usual appearance of objects [13; 14].

There are separate recommendations for the sustainable development of the work of the publishing house itself. At the stage of editing, it is suggested to abandon the usual use of paper and edit the text exclusively electronically. And at

the stage of advertising promotion of the print run, it is recommended to use mainly electronic resources: websites, social networks, contextual advertising.

All these actions will help to reduce the industry's resource consumption already at the design stage. The application of ecological principles in production is also an important step towards improving eco-efficiency in the industry. Major publishing brands are actively working on the development of 'green' technologies for the development of printing, which indicates the growing interest in environmental efficiency in this industry [15].

Discussion and Conclusion. In today's world, design plays a new role related to the ecological loyalty of printing production and responsibility towards the environment. Environmental challenges are now changing the behaviour of both consumers and producers. Many print brands are seeking to place information on their products about their own sustainable practices, use of sustainable materials, recycling processes, and participation in environmental initiatives.

The use of sustainable and biodegradable materials and recycled cartons is becoming an important challenge for many design approaches. The introduction of new technologies, training of ecological design professionals, and co-operation with environmentally oriented suppliers of materials and equipment are required.

Ecological design is becoming an integral part of publishing companies' development strategies and production processes, which is reflected in their mission and goals. In an ecological approach to design in the printing industry, various aspects related to the use of ecological materials, printing inks, as well as the reduction of emissions and the implementation of zero-waste production principles are important. Ecological design in printing represents an important area that contributes to the normalisation of the relationship between humans and the environment.

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Conflict of Interest Statement: the authors declare no conflict of interest.

All authors have read and approved the final manuscript.

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Конфликт интересов: авторы заявляют об отсутствии конфликта интересов.

Все авторы прочитали и одобрили окончательный вариант рукописи.

Received / Поступила в редакцию 18.12.2024

Revised / Поступила после рецензирования 09.01.2025

Accepted / Принята к публикации 12.01.2025