“Several colors of scientific consulting: Ukrainian cases”

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SEVERAL COLORS OF SCIENTIFIC CONSULTING: UKRAINIAN CASES

Abstract

The proliferation of unethical scientific consulting practices, particularly in post-Soviet contexts, poses significant threats to academic integrity by transforming legitimate knowledge transfer services into commercialized systems that fabricate academic outputs to meet formal performance metrics rather than supporting genuine research efforts. This study aims to analyze and classify different forms of scientific consulting based on their ethical alignment and function within academic systems, introducing the concept of "scientific consulting mills" as a comprehensive framework for understanding these distorted practices. The study employs qualitative content analysis of Ukrainian and international sources, bibliometric review, and a conceptual typology approach, including a Ukrainian academic landscape case study and a color-coded classification model categorizing service providers based on transparency, legality, and ethical compliance. The analysis reveals that growing demand for formal academic indicators fuels the rise of scientific consulting mills that exploit systemic weaknesses in academic evaluation systems. These mills commodify academic achievements and decouple performance metrics from genuine research contributions, offering services ranging from legitimate professional support to fraudulent activities. The paper includes a case study of the Ukrainian academic landscape, complemented by a classification model ("color-coded" types of scientific consulting) that categorizes service providers and practices based on transparency, legality, and ethical compliance. The proposed "scientific consulting mills" concept offers a broader categorization than existing frameworks, such as paper mills, encompassing diverse services that breach academic ethics while masquerading as legitimate consultancy. This concept provides critical insights for combating academic misconduct.

Keywords scientific consulting, paper mills, scientific consulting mills

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REFLEXIVE PREFACE

Having worked across the Ukrainian academy, I have witnessed firsthand how the pressure to meet formal performance indicators can corrupt the very essence of scientific endeavor. What drives me is not just academic curiosity, but a deep concern for preserving the credibility of science itself.

In the Ukrainian academic environment, I have encountered colleagues who face impossible choices: either accept career stagnation or seek "assistance" from questionable consulting services.

The moment I decided to undertake this study came from observing a disturbing trend: increasingly, conversations among Ukrainian colleagues were not about breakthrough research or innovative methodologies, but about meeting citation quotas, achieving specific H-index targets, or finding ways to boost publication counts. I realized that the focus had shifted from "What important questions can we answer?" to "How can we satisfy the next evaluation?"

I have received offers from various "consulting" services, and I have seen how these organizations market themselves with legitimate language while offering services that fundamentally undermine academ-

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ic integrity. This direct exposure to the problem made me realize that the issue needed systematic analysis and classification.

I approached this study knowing it might make me unpopular in certain circles. Some colleagues might view this paper as "washing dirty laundry in public" or potentially damaging the reputation of Ukrainian academics. However, honest diagnosis is essential for healing, and academic communities can only improve through frank acknowledgment of problems.

While I am critical of scientific consulting mills, I have tried to maintain understanding for the researchers who use these services. My goal is not to shame individuals but to highlight systemic issues that need addressing. Rather than simply condemning unethical practices, I wanted to create a framework to help institutions and researchers distinguish between legitimate support and fraudulent services. The color-coding system evolved from my desire to offer practical guidance rather than merely academic criticism.

There is always the risk of being seen as judgmental or elitist, particularly by researchers who feel they have no choice but to use these services.

I have also grappled with whether exposing these practices might inadvertently harm Ukrainian academia's international reputation. However, I have concluded that silence only allows problems to fester, while honest analysis creates opportunities for positive change.

This study represents the beginning of what I hope will be a broader conversation about research integrity and academic evaluation. I plan to continue this work, focusing on developing practical solutions and working with institutions to implement more ethical and effective evaluation systems.

INTRODUCTION

Performance indicators in scientists' profiles in scientometric databases, scientific networks, and on the pages of the employer organization are the result of their personal, persistent, and long-term work. Scientists work on their profiles either personally or as part of a team they lead (of which they are a part). This portrait, a business card, is a kind of scientist's pass to the world of international scientific networking, with the receipt of all the benefits of cooperation.

A scientist's profile consists of trivial elements, the main ones of which are scientometric indicators, publications, skills, work experience, participation in scientific projects at the national and international level, scientific internships, and certification courses. If a scientist combines educational and scientific activities, various teaching achievements appear in such a profile.

The visibility and credibility of a scientist in the global academic community are closely tied to the quality and completeness of their professional profile. This profile serves as a digital portfolio reflecting the scientist's expertise, achievements, and collaborative potential and acts as a gateway to new opportunities for international cooperation, funding, and recognition. By systematically updating their scientometric indicators, documenting participation in research projects, and highlighting both scientific and teaching accomplishments, researchers enhance their professional reputation and expand their networking possibilities.

However, building and maintaining a comprehensive profile is not merely a technical or administrative task. It is fundamentally shaped by the scientist's underlying motivations and the external incentives in the academic environment. The interplay between personal aspirations for self-realization and the formal requirements imposed by institutions or regulatory bodies creates a dynamic context in which scientists must operate.

What is the incentive and motivation of a scientist to have a profile as a success story? What is more important: incentive or motivation? Motivation refers to the result of the scientist's activity (self-realization, professional growth), and the incentive is associated with the "production" of the product needed to fulfill formal indicators and qualification requirements.

Formal indicators and qualification requirements accompany the Ukrainian scientist throughout his career. Periodic advanced training, obtaining an academic title, KPI contract, licensing requirements for teaching within the framework of an educational program – this is not a complete list of "places" where indicators of scientific activity are required. A scientist with high motivation and good personal or team performance will successfully achieve the desired indicators.

However, what to do if a scientist wants to achieve the indicators set by the incentive for career advancement or additional income, but the productivity is insufficient, and there is no personal scientific team? The natural course of the process is to stop at what has been achieved and be content with the current position. However, there is another path that a scientist takes to satisfy distorted motivation: there is no scientific result, but there is self-realization and professional growth. In this case, it is necessary to look for a team to help achieve the scientific activity indicators. However, this is not a scientific team. A team of "scientific consultants" will provide not a scientific result but a formal (material) product in the form of articles, certificates, scientometric indicators, etc.

1. BACKGROUND

Traditionally, scientific consulting is associated with conducting scientific research in a specific field of knowledge; scientific consulting services involve forming an expert opinion on the prospects for commercializing a scientific development and its entry into the market.

The main property of traditional scientific consulting is that the result of the services provided is a scientific product, but the use of this scientific product to ensure formal indicators and qualification requirements of a specific scientist is not provided. The scientific product does not have an acceptable form for use as an indicator of scientific activity and efficiency. In traditional scientific consulting, the scientific product's content is essential, not its transformation into a unit of the scientist's productivity (e.g., article, certificate, scientometric indicators, etc.).

Scientific consulting is critical in shaping innovation and policy in leading countries such as the United States, Germany, and the United Kingdom. In the United States, firms like Battelle (Battelle, 2023) provide consulting services in defense, energy, public health, and environmental policy, leveraging deep scientific expertise to influence national strategies. Germany, renowned for its engineering and industrial innovation, relies heavily on scientific consultants to optimize manufacturing processes, ensure environmental compliance, and develop effective renewable energy transition strategies. For instance, the Fraunhofer Society (Fraunhofer-Gesellschaft, 2024) is a leading provider of applied research and consulting for both the public and private sectors. In the UK, institutions such as Cambridge Consultants (Cambridge Consultants, 2023) offer medical technology, telecommunications, and artificial intelligence services, helping companies bring scientifically grounded products to market. These examples illustrate how countries with strong scientific infrastructures integrate consulting into economic and policy development.

In Ukraine, there are also two formal directions under the definition of "scientific consulting". The first direction is traditional consulting with a scientific product. The second direction is scientific consulting with a result in the form of a unit of scientific productivity of a scientist and, in most cases, the absence of a scientific product that has gone through the complete cycle of "production" by the scientist himself. The second direction of so-called scientific consulting for scientists in Ukraine arose as a natural reaction of not very virtuous business to the demand of unmotivated scientists to obtain formal indicators and fulfill the qualification requirements of scientific activity.

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The dark side of scientific consulting encompasses a range of unethical practices, prominently including ghostwriting and the emergence of paper mills. Ghostwriting typically involves individuals from the pharmaceutical or medical industries hiring ghostwriters to create articles attributed to researchers who may not have contributed substantively to the work. This stream poses significant ethical dilemmas related to authorship and accountability in scientific publications (Stretton, 2014; DeTora, 2016; Bosch, 2011). The increasing prevalence of ghostwriting undermines trust in medical literature as it frequently obscures the real contributions of researchers and promotes biased or misrepresented scientific claims, particularly in clinical contexts where the stakes, such as patient health, are profound (Bosch et al., 2012; Stern & Lemmens, 2011). Systematic reviews indicate that ghostwriting remains a widespread problem, suggesting a clear need for stricter enforcement of ethical guidelines across the scientific community (Stretton, 2014; Newton, 2018; Singh & Remenyi, 2018).

Companies providing "scientific consulting" formulate this definition: "Scientific consulting is a consultation on the nutrition of their publications and follow-up of professional intermediaries. Consultants from these specialized companies provide authors with recommendations, informational support, and support for the latest publications" (Nim Media, 2019). In other words, they explain the difficult stages of work on the article and indicate where the main challenges may arise during publication. In this interpretation, without details, this definition looks quite constructive. This definition is confirmed by another source (Osvita.ua, 2022). However, as the analysis shows, among the services of "scientific consulting" companies (a specific list of companies is not given so as not to create an advertising campaign for them), one can find those that do not correspond to the above definition and are a violation of academic integrity.

Among them are:

- writing dissertations, monographs, scientific articles, abstracts of reports, textbooks, etc., on order;
- selling co-authorship;
- selling membership in editorial boards of scientific journals;
- selling places in the team of performers of scientific research works, which are carried out at the expense of the state budget and international donors;
- increasing the scientist's Hirsch index.

The phenomenon of "scientific consulting" in Ukraine was studied in detail by Wise (2023) using one of the companies as an example. Interestingly, a refutation was promptly prepared for this article, which was presented as an advertisement for scientific consulting services (Scientific Publications, 2023).

The phenomenon of scientific consulting has features similar to a paper mill. Still, it differs from this definition in that the range of services that violate the principles of academic integrity is broader than that of a paper mill.

It should be noted that the term "scientific consulting" has a variant with a dishonest accent only in the post-Soviet space. Therefore, it is necessary to provide a comparative illustration of "scientific consulting" in Ukraine and abroad (Figure 1).

The fundamental difference between the two approaches of scientific consulting lies in their purpose and adherence to research ethics (Figure 2). Legitimate scientific consulting prioritizes problem-solving, decision-making, and the ethical use of information within an organization, ensuring that services are grounded in integrity. In contrast, scientific consulting mills exploit the research system by producing content that meets superficial academic requirements without contributing to genuine knowledge advancement. The visual structure of the illustration reinforces this distinction by clearly separating the two models and highlighting their divergent processes, agreements, and end uses.

The term "scientific consulting mills," which "covers" a set of services from the "supplier" to obtain formal performance indicators of a scientist and teacher, as well as a broader classification of "suppliers" of services and the features of their activities, is proposed. Scientific consulting mills can be defined as structured commercialized systems that provide services

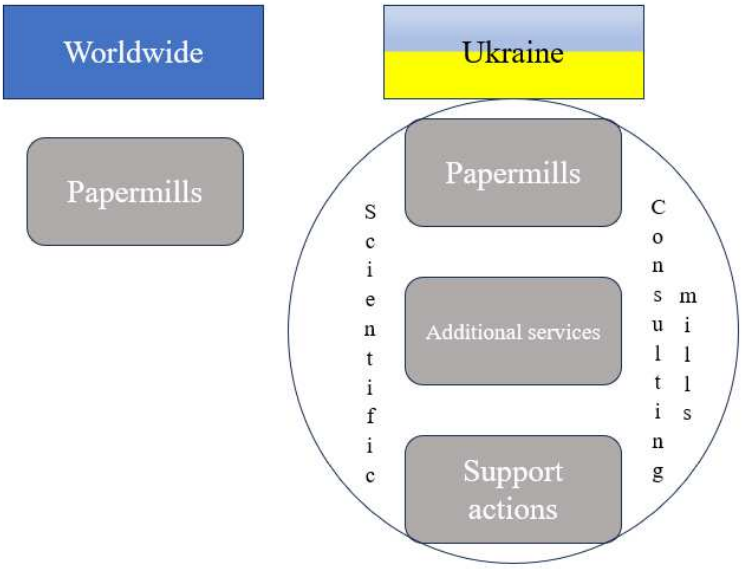

Figure 1. Advanced paper mill in Ukraine: Scientific consulting mills

based on legal contracts for providing of information services or informal, verbal agreements between a customer (typically a researcher or educator) and a performer (service provider) aimed at fulfilling formal academic indicators and qualification requirements without generating genuine scientific or educational outcomes. The following characteristic features describe each type of "supplier" of services:

- list of services;
- result (product) received by the customer;
- format of cooperation between the customer and the performer;
- frequency of service provision;
- who is a customer?
- who is a performer?

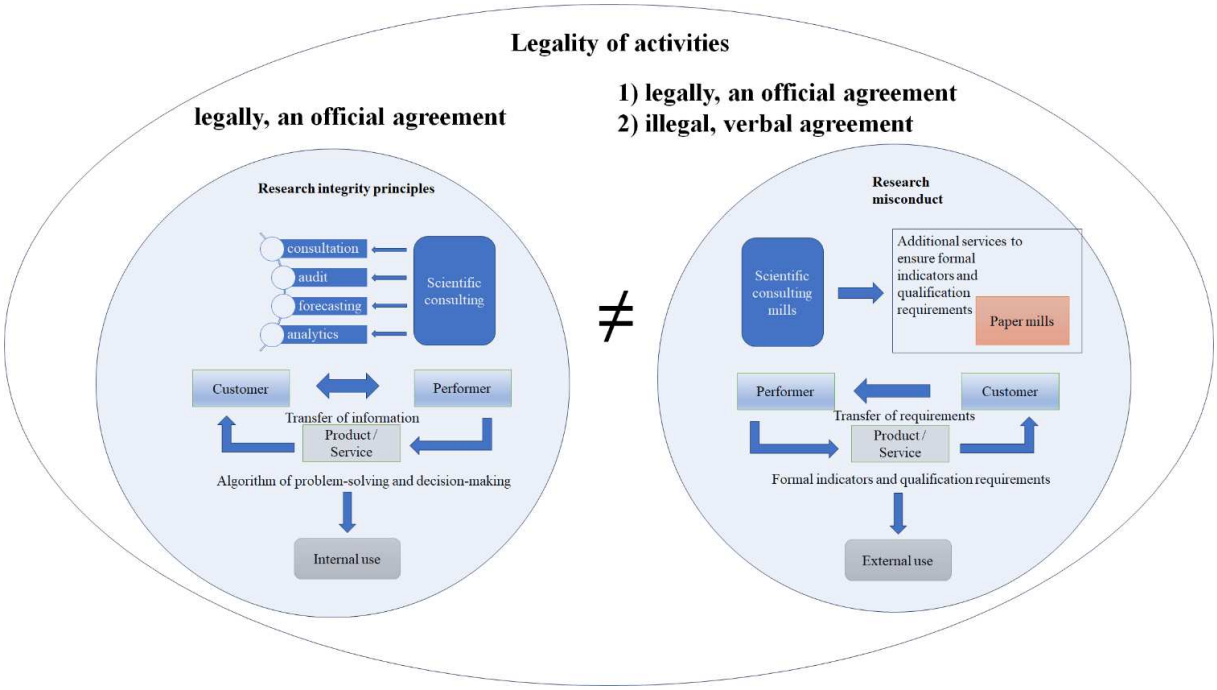

Figure 2. Scientific consulting vs. scientific consulting mills

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1.1. Colors of scientific consulting

1.1.1. Scientific consulting from organizations

White scientific consulting represents the most legitimate and ethical scientific consulting services. This category encompasses traditional research and development activities, business consulting for enterprises, and mentoring services for scientists pursuing commercialization of their work. The services operate under formal contracts with clear technical specifications, providing turnkey solutions that support genuine educational and scientific activities. The relationship between customers and performers is transparent and professional, with organizations employing qualified experts and consultants who work either permanently or on a contract basis to deliver research services and science-intensive solutions without any hidden agendas or questionable practices.

Gray scientific consulting occupies a middle ground that incorporates some elements of questionable practices while maintaining certain legitimate aspects. This category includes services such as grant writing, systematic organization of internships and conferences as primary business activities, and mediation in article publication. While these services may appear legitimate on the surface, they often promote questionable products. They may primarily focus on helping clients achieve qualification goals like scientific degrees or academic titles rather than advancing genuine scientific knowledge. The business model operates continuously rather than on demand, and the contractual arrangements may be either formal or completely absent, creating ambiguity in professional relationships.

Black scientific consulting represents the most unethical and illegitimate category, operating as full-fledged scientific consulting mills. These organizations engage in practices that fundamentally undermine scientific integrity, including operating paper mills, selling authorship on research papers, selling citations, selling positions on journal editorial boards, and selling various credentials and memberships. The services are designed to help clients achieve qualification goals through fraudulent means, operating continuously with formal and informal arrangements. The network of performers extends beyond typical consultants to include compromised journal editorial boards, corrupt scientists, and organizations that issue fraudulent qualification documents.

1.1.2. Scientific consulting from an individual

Green scientific consulting presents an interesting case where the traditional customer-performer relationship breaks down entirely. In this model, the customer and performer are essentially the same entity. This category lacks formal regulation regarding services offered, cooperation formats, and periodicity, operating entirely based on the customer's specifications and timelines.

Yellow scientific consulting involves the exploitation of official positions and personal connections to provide services similar to those found in black consulting mills. This category encompasses a range of unethical services, including paper mills, selling authorship, and selling various credentials, which operate through informal networks based on personal relationships and the abuse of professional positions. The cooperation format is unregulated, and services are provided on an ad-hoc basis when requested, with individual colleagues serving as performers rather than formal organizations.

Red scientific consulting is perhaps the most shadowy category, focusing primarily on advertising paper mill operations through sales and service platforms. This category operates with completely unknown performers, making it the most anonymous and potentially dangerous form of scientific consulting fraud. The services are provided continuously to individuals and organizations, with completely unregulated cooperation formats and a primary focus on helping clients achieve qualification goals through fraudulent academic papers and publications.

CONCLUSION

The study revealed that the growing demand for formal academic indicators has fueled the proliferation of scientific consulting mills that exploit systemic weaknesses in academic evaluation systems.

Through the proposed color-coded classification system, six distinct categories of scientific consulting were identified: white (legitimate ethical consulting), green (self-driven scientific activity), gray (ambiguous practices with mixed legitimacy), and three unethical categories: black (organized scientific consulting mills), yellow (exploitation of official positions), and red (anonymous paper mill operations). These categories represent a spectrum from ethical academic support to systematic manipulation of scientific metrics, demonstrating how commercialized systems have emerged to provide fabricated academic outputs that satisfy formal performance requirements without generating genuine research contributions. The study concludes that scientific consulting mills significantly threaten academic integrity by decoupling performance metrics from authentic research contributions and commodifying academic achievements. The color-coded framework serves as a critical tool for identifying and combating various forms of academic misconduct, while also highlighting the need for institutional reforms in academic evaluation systems. The distinction between legitimate scientific consulting that supports genuine knowledge advancement and scientific consulting mills that exploit formal requirements underscores the importance of addressing demand-side pressures (unrealistic performance indicators) and supply-side responses (unethical service providers) to preserve the integrity of the global academic enterprise. Ultimately, the choice between authentic scientific contribution and fabricated productivity reflects deeper questions about the purpose and values underlying academic work in an increasingly metrics-driven environment.

AUTHOR CONTRIBUTIONS

Conceptualization: Artem Artyukhov.
Formal analysis: Artem Artyukhov.
Investigation: Artem Artyukhov.
Methodology: Artem Artyukhov.
Project administration: Artem Artyukhov.
Resources: Artem Artyukhov.
Supervision: Artem Artyukhov.
Writing – original draft: Artem Artyukhov.
Writing – review & editing: Artem Artyukhov.

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