EXPLORING THE MODELING OF SOCIO-TECHNICAL SYSTEMS IN THE FIELDS OF SPORT, ENGINEERING AND ECONOMICS

Nagham Hameed Abdulkhudhur Alyaseri[1], Mazen Dawood Salman[2], Rabab Wahhab Maseer[3], Emad Kamil Hussein[4], Kussay Ahmed Subhi[4], Salima Abdullah Alwan[5], Jasim Gshayyish zwaid[6], Ashham Mohammed Aned[7], Karrar Kareem Jawad[8], Hakeem Hammood Flayyih[9], Hussein Kadhim Sharaf[10]*, Nasseer Kassim Bachache[11], Rajaa Ali Abed[12]

[1]College of Administration and Economics, Wasit University, Ministry of Higher Education and Scientific Research, Republic of Iraq; [2]College of Administration and Economics, University of Baghdad, Iraq; [3]Accounting Department, College of Administration and Economics, University of Baghdad, Iraq; [4]Department of Mechanical Equipment Engineering Department, Al-Mussaib Technical College TCM, Al-Furat Al-Awsat Technical University ATU, Al-Mussaib, Babil, Iraq; [5]Studious Activities Unit, College of Arts, University of Baghdad, Iraq; [6]Department of Accounting, Technical Institute- Kut , Middle Technical University, Baghdad, Iraq; [7]Department of Mechanical Technical/Production, Al kut Technical Institution, Middle Technical University, Baghdad, Iraq; [8]Department of Accounting, College of Administration and Economics, Mustansiriyah University, Iraq; [9]College of Administration and Economics, University of Baghdad, Iraq; [10]Department of Aeronautical Techniques Engineering, Bilad Alrafidain University College, Al-Quds intersection, Baqubah, Diyala, Iraq; Department of Medical Instrumentation Engineering Techniques, Dijlah University College, Baghdad, Iraq; [11]Electric Power Techniques Engineering Department, Bilad Alrafidain University College, Al-Quds intersection, Baqubah, Diyala, Iraq; [12]Department of Accounting, Technical Institute- Kut, Middle Technical University, Al Za'faraniya, Baghdad, Iraq

Manuscrito recibido: 05/05/2023
Manuscrito aceptado: 19/05/2023

*Corresponding Author: Hussein Kadhim Sharaf, Department of Aeronautical Techniques Engineering, Bilad Alrafidain University College, Al-Quds intersection, Baqubah, Diyala, Iraq; Department of Medical Instrumentation Engineering Techniques, Dijlah University College, Baghdad, Iraq

Correo-e: hk.sharaf92@gmail.com

Abstract

Socio-Technical Systems (STS) represent a complex interplay between engineering and economics, encompassing the interaction of technological components with social, organizational, and economic factors. This research aims to investigate the dynamics and implications of STS in the context of engineering and economics. By employing an interdisciplinary approach, it seeks to understand the reciprocal influences between engineering and economics within STS and explore the challenges and opportunities arising from this nexus. The research will draw on quantitative and qualitative methods, including data analysis, case studies, and stakeholder interviews, to provide a comprehensive understanding of the role of STS in driving socio-economic outcomes. The findings will inform decision-making processes, policy development, and future research directions in the fields of engineering and economics.

Keywords: Socio-technical systems. Sports. Engineering. Economics.

Introduction

It is well-documented that race plays a critical role in how people think, develop, and navigate the social world (Mouhmmd et al, 2023). Given that race is a social construct, racialized experiences that differ both between and within groups can give rise to racial differences in psychology (Alyaseri et al, 2023; Alyaseri al, 2022). For example, at birth, infants can differentiate among individuals of various races. By 3 months, however, those raised in racially homogeneous contexts become less able to differentiate among mem- bers of unfamiliar races, perceiving that they all look and sound alike (Alyaseri , 2021). As another example, individuals raised in relatively collectivistic contexts often focus on others, whereas those raised in relatively individualistic contexts often focus on themselves, which can give rise to racial differences in memory construction and recall (Salman et al, 2022). During and after a lifetime of such racialized experiences, including those involving access to social resources, experiences with discrimination, inter- racial contact, social norms, social segregation, and socioeconomic status, it is no surprise that race plays a critical role in psychological phenomena, including but not limited to those involving activism, auditory and visual processing, conformity, emotions, executive functioning, interpersonal relationships, memory, neural activity, parenting, psychological and physiological health, and religious cognition (Almagsoosi et al, 2022; Alwan, 2022).

Thus, one might expect psychological science to frequently publish research that highlights the important role of race in human psychology and for psychological scientists to work with racially diverse populations. Yet decades of critiques advocating for this seem to have gone unnoticed.

In fact, Ashham et al, (2017) found that across 1,149 articles published in 2015 and 2016 in 11 psychology journals, 73% of them never even mentioned the race of their participants.

It is also well documented that race plays a critical role in the extent to which people even care about race. Evidence for this emerges early in development. For example, in the United States, White children experience racial diversity and discrimination less often than do children of color, and White parents speak with their children about race less often than do parents of color, which results in White children being less focused on race and less sensitive to racial issues than are children of color . By adulthood, White persons are more likely than persons of color (POCs) to avoid conversations about race, potentially because they feel inexperienced in the subject or because they are motivated, either consciously or unconsciously, to main- tain an illusion of postracialism .

Consequentially, one might expect White journal editors—whose gatekeeping function positions them to govern what is worthy of publication—to be less likely than journal editors of color to publish research that highlights the role of race in human psychology. And one might expect White psychological scientists— whose position allows them to determine what is wor- thy of study and who is worthy of participation—to be less likely than psychological scientists of color to include research participants of color in their research.

This would be especially concerning given that most psychological scientists, even those who study race, are White (Raheemah et al, 2021). That is, a scarcity of research participants of color may be symptomatic of a scarcity of scholarship of color, which may itself be symptomatic of a scarcity of editors of color. Thus, an important question is whether a lack of racial diversity among psychology's editors and authors has systemic implications for what and who is included in the permanent scientific record (Subhi et al, 2022).

From our perspective, a strong psychological science must examine and understand racialized experiences in psychological phenomena and include editors, authors, and participants of diverse racial identities in the research process. These are not equivalent issues, but they are connected. Hypothetically, a White editor could accept a manuscript written by a White author that focuses on White participants' concepts of race, and this manuscript would contribute to psychological science's understanding of race yet exclude diverse perspectives from evaluating, writing, and participating in that science. In addition, a Native American editor could reject a publication by a Native American author that focuses on Native American participants' concepts of race, and this manuscript would not contribute to psychological science's understanding of race yet include underrepresented perspectives in that science (Sharaf et al, 2022).

Phycology in Engineering

What is the value of engineering to philosophy, or of philosophy to engineering? The series began with an exploration of this issue. Can philosophy be of use to engineering, when engineering depends for its existence on obtaining practical results whilst philosophy seems content without them? It was conceded that philosophy might be of practical ser- vice to engineers by lending the methods of conceptual clarification and clear argument, thus aiding engineers in dealing with complex problems – especially ethical questions that arise in dealing with risk and safety. However, is it really philosophy which is of help here, or philosophers with their particular skills? Is there a place at all for philosophy of engineering, as a disinterested study of engineering as something 'other', or is philosophy for or in engineering more useful – applying philosophical methods within engineering? Moreover, should philosophers be willing to supply such a service, when the practical world of engineering is unlikely to be of interest to them?

In what follows I hope it will become clear that philosophy of engineering is a legitimate venture that can be of value to both the engineer and the philosopher. Philosophy can have practical value for engineers (Taresh & Alwan, 2022). the methods and products of engineering can afford enlightenment on problems with which philosophers have grappled for centuries; and engineering can provide a source of novel problems for philosophers to investigate When considering the status of our knowledge of the world, philosophers tend to focus either on the veracity of an individual's beliefs (the paradigm case being Descartes' method of doubt in the Meditations), or on the standing of scientific theories as candidates for truth (whether theories can be true or merely useful, and whether we can know that a theory is true). However, an investigation of the kind of knowledge created and employed by engineering demonstrates the limitations of this method and the results that it will yield (Aidi et al., 2023).

The first lesson is that not all knowledge exists in the form of beliefs, nor can it be expressed in the propositional form necessary for codification in a theory. A number of speakers in the seminars have pointed to the relevance of Gilbert Ryle's notion of 'know- ledge how' to understanding the nature of engineering knowledge. Ryle distinguished between knowledge that, knowledge of facts or generalisations that can be expressed in language, and knowledge how, which is manifested in practical abilities and cannot be con- veyed verbally. Engineering involves and is dependent on knowing how to do things rather than (just) knowing that certain things are true. The kinds of 'know-how' that are funda- mental to engineering are the basic practical knowledge of how to use tools correctly, the more sophisticated knowledge of how to develop a design to overcome faults (something that may not always be reducible to scientific analysis), and the well-developed intuition of an experienced engineer that allows faults to be diagnosed or predicted (Talab & Flayyih, 2023).

In his talk 'Plato and the internet: liberating knowledge from our heads' given at the first seminar in November 2006, Kieron O'Hara demonstrated that there were further ways in which the knowledge generated by engineering differs from the model of knowledge that is the focus of philosophical reflection. The conception of knowledge as a species of belief seems somewhat limited when one considers the significant amount of engineering know- ledge held by organizations rather than individuals. The kind of knowledge generated by engineering projects which are large-scale, complex, and carried out by many teams working on different tasks can never be possessed by one individual. Rather, it is held in different people's heads, in databases, in records and on the internet. O'Hara points out that it is not only engineering knowledge which has this character. Much of our everyday knowledge has this form, as a result of engineering advances that have allowed vast amounts of data to be stored on individual computers, networks and the internet.

Thus, unless one simply insists that for something to be knowledge it must be in the head of an individual,3 it is reasonable to argue that some knowledge, not being belief, nor existing in the heads of individuals, cannot be open to doubt in the way that Descartes doubted his beliefs and experiences. This knowledge can also not be set down in scientific theories, and so it ducks the debate of whether it can be true or not, or whether we can know its truth. This has far-reaching ramifications for philosophical issues. It reveals that there is a class of knowledge that eludes the 'justified true belief' model philosophers have struggled to improve over centuries,4 and that escapes philosophical questions over the 'truth-hood' of scientific theories.5 This reveals the value of a philosophical understanding of engineering method.

Interdisciplinary Perspectives on Socio-Technical Systems in Engineering and Economics

The role of engineering in socio-technical systems

Engineering plays a crucial role in the development, design, and implementation of technological components within Socio-Technical Systems. From a systems perspective, engineers contribute their technical expertise to ensure the functionality, reliability, and safety of the technological infrastructure. They address complex engineering challenges and strive to optimize the performance of the system by integrating various technical elements and considering social, organizational, and economic factors. Engineering perspectives on Socio-Technical Systems emphasize the importance of aligning technological advancements with societal needs, values, and economic viability.

The role of economics in socio-technical systems

Economics provides valuable insights into the behavior and decision-making of individuals, organizations, and markets within Socio-Technical Systems. Economic perspectives on STS focus on the allocation and utilization of resources, cost-benefit analysis, market dynamics, and the economic impact of technological innovations. Economists examine the incentives, constraints, and trade-offs associated with the adoption and diffusion of technological solutions in different contexts. They assess the economic feasibility, sustainability, and long-term viability of Socio-Technical Systems, considering factors such as market demand, pricing mechanisms, and regulatory frameworks.

Integration of engineering and economics in socio-technical systems

The integration of engineering and economics within Socio-Technical Systems requires interdisciplinary collaboration and coordination. It involves leveraging engineering expertise to develop technological solutions that align with economic objectives and market dynamics. This integration entails assessing the economic viability and financial implications of engineering decisions, such as investment costs, operational expenses, and potential revenue streams. Furthermore, it involves considering the social and environmental impacts of engineering choices to ensure the sustainability and ethical dimensions of Socio-Technical Systems. Interdisciplinary perspectives on STS in engineering and economics emphasize the need for holistic approaches that balance technical feasibility, economic viability, and societal considerations.

Challenges and opportunities for interdisciplinary research

The interdisciplinary nature of studying Socio-Technical Systems in engineering and economics presents both challenges and opportunities. Challenges include the need for effective communication and collaboration between engineers and economists, as they come from different disciplinary backgrounds with distinct terminologies and methodologies. Moreover, integrating diverse perspectives requires addressing inherent tensions between technical requirements and economic constraints. However, interdisciplinary research offers opportunities for innovation, knowledge exchange, and the development of comprehensive frameworks that capture the complexity of Socio-Technical Systems. It enables a deeper understanding of the socio-economic implications, trade-offs, and synergies within these systems, leading to more informed decision-making processes and policy development. In summary, interdisciplinary perspectives on Socio-Technical Systems in engineering and economics provide valuable insights into the interplay between technological components, economic dynamics, and societal considerations. The integration of engineering and economics within STS offers opportunities to enhance the design, implementation, and sustainability of complex systems. By considering the perspectives and expertise from both disciplines, researchers can contribute to the development of more robust frameworks, methodologies, and strategies that promote the successful integration of technology and economics in Socio-Technical Systems.

Philosophy of Engineering Based Mind-Body Issues

Scientists have the luxury of devising theories to fit idealized situations. Although they must submit to experimental verification, the tests take place in the laboratory under care- fully controlled conditions. The aim is, of course, to create theories that are universally true, rather than fitting only local circumstances.

While physicists build theories, engineers design systems. Although idealization may take place in some stages of design, in the implementation of the system the complexities of the real world must be taken into account – not least the complexities that arise through human involvement in systems. Engineers design systems that will be operated and used by and will affect the lives and environments of real people. Those people will at the same time affect the functioning of the systems. a paper given in March 2007 at the second seminar, Maarten Franssen classed systems that necessarily involve human agents as 'sociotechnical systems. One of his examples was transport control systems. These systems are devised to manage the flow of traffic through a city or town. However, such systems must take into account the functioning of cars, the geography of cities and the behaviour of drivers. Franssen's point was that the design of such systems requires recourse to quite distinct models and methods of analysis – those of the natural and social sciences. Looking at the implementation of designs in the real world brings out philosophically interesting issues that do not arise when simply considering the status of idealised theories based on experiments made under laboratory conditions. Questions arise about the nature of the interrelation between these two forms of description. Are they commensurable? Is an overarching description of the whole system possible, and is accurate prediction possible without it? What is the nature of the knowledge that the engineer has of the system and how it functions?

These questions are of philosophical interest because they highlight a clash of des- criptions that philosophers are apt to deal with, and they link to another area in which engineering products admit of different, and often incompatible, descriptions. At the University of Delft an extended project on 'the dual nature of technical artefacts' has dis- cussed how to align alternative descriptions of artefacts – the description of the function of the artefact couched in intentional or teleological terms, and the causal, deterministic description of the physical properties of the artefact. This is the kind of problem that philosophers have engaged with for many years – similar, for example, to the mind–body problem which deals with the puzzle of how the mind, which is governed by psychological laws, interacts with a body governed by physical laws. There are two important lessons here: first, that engineering gives rise to deep questions of the sort that philosophers can engage with; second, that since philosophers have many decades of experience grappling with intractable questions like the mind–body problem which seek ways to connect physical and psychological laws and descriptions, they may have insights that can help with the design and management of sociotechnical systems. Here we see the value of engineering as a source of unique philosophical puzzles.

The Engineering of Phenomenological Systems

When philosophers consider the nature of the mind, the primary mode of investigation is the construction of thought experiments and reflection on their results. It is through such means that philosophers investigate the nature of consciousness – what it is to be con- scious, and whether machines could ever be conscious. Work in Artificial Intelligence (AI) can also yield insights into the nature of consciousness, and one such insight is the inti- mate connection between being conscious and being in the world. Igor Aleksander, in 'The engineering of phenomenological systems', given at the third seminar in July 2007, argued that mental representation depends essentially on physical relation to the object in the world being represented – for example, the movement of eye musculature is essential to constructing a conscious awareness of what one is observing. Therefore, to build a conscious machine it will be essential to build a physical system that can move and respond in a similar way to embodied, conscious beings. Aleksander referenced the work of Owen Holland at the University of Essex, who has carried out research into producing a conscious robot. An essential feature of this robot is its physical structure, which allows it to move and to sense this movement. Aleksander argues that, in order to build a con- scious system, it is of course essential to know what consciousness consists in. But he also shows that the engineering side of AI – the side that involves actually attempting to con- struct artificial, conscious systems – is at least as important as the philosophical side which is dedicated to consideration of the possibility of an artificially conscious system.

This was Ron Chrisley's point in his talk 'Interactive empiricism: the philosopher in the machine' at the same seminar. His argument was that certain philosophical questions will only receive elucidation if the philosophers considering them interact in an appropriate way with the subject of the questions. His view was that conceptual change cannot always occur through mere argument or reflection. Some conceptual clarifications may only come about in the way that skills are developed. Skills depend on knowing how to do something – as described above – and usually require experience rather than verbal explanation alone. Chrisley's argument is that some of the concepts of interest to philosophy are of this character. For example, understanding what consciousness is will involve working with it, trying to recreate it and so on. This idea of there being an aspect of understanding or concept possession that is like having a skill or mastering a technique might be considered philosophically contentious. However, the work discussed by Aleksander serves to suggest that there is scope for learning philosophical lessons through this method, lessons that may not be learnt through a priori reasoning alone.

Both of these papers raised the important issue of the place in philosophy not just for empirical information gained through observation, but for interaction with the world. Designing, making, using and improving artefacts can shed light on philosophical issues – employing synthesis as well as the traditional philosophical methods of analysis. Thus there is a role for philosophy of engineering in shedding light on established philosophical problems, and doing this through engineering, rather than philosophical, method.

Wittgenstein argued in his Philosophical Investigations that much is to be learned about language by focusing on its use. Advances in engineering allow us to look not only at language in use, but at the process of inventing language – the process of establishing classifications and constructing meaning.

Again at the July 2007 seminar, Nigel Shadbolt argued in 'Philosophical engineering' that the web, and more importantly its potential successor the 'semantic web', offers sig- nificant fuel for the philosopher of language. In the semantic web, items that appear on websites will have a much richer set of metadata describing what those items are. For example, if someone's homepage includes a picture of them, a list of their publications and a link to a conference at which they will be speaking, those items will be tagged with infor- mation which identifies those things as respectively a photograph, a list of publications and a link to a conference. This means that instead of webpages being documents carrying information only about the formatting of the page, they will consist of distinct items which have meaning or content associated with them, describing what they are. The semantic web will be a web of data rather than documents and this will mean that searching it will be a different process, allowing a search to pick out particular bits of relevant data, instead of whole pages or documents in which those data may somewhere occur. In order to assign meaning to such items a conceptual scheme has to be established to allow them to be appropriately classified. This establishment of an ontology for the web is in many ways a technical pursuit, but it raises issues of interest to philosophers concerned with questions about meaning and classification. To make the system work, meaning has to be established in an appropriate way. Setting up a classification or naming scheme has. the potential to reveal the mechanisms by which classificatory terms have the meaning they do. Shadbolt argues that the process used in constructing an ontological scheme for the semantic web supports a realist, positivist theory of meaning, according to which language maps directly onto the world, with names standing in a one-to-one mapping with objects. However, another area of interest to such philosophers should be the emergence of vocabularies in Web 2.0 – the description given to websites based on user-generated con- tent and/or networking, such as blogs and websites like Myspace, Flickr and Facebook. In such sites, individuals can 'tag' items like photographs, other webpages or articles and create links between them. By observing the tagging practices of users of such spaces Shadbolt explains that it is possible to see 'tag clouds' form, loose classifications that emerge out of individuals' labelling of content on the web. Shadbolt argues that this evolution of classification fits more neatly with a constructivist notion of meaning, in which the meaning of terms is given by their use, and this meaning is open-ended, without fixed rules for all and every application. We could see the practices that Shadbolt describes as kinds of Wittgenstein an language games. The game played by users of social networking sites is one kind of language game, revealing the particular way in which such a community uses language. The game played by those building the semantic web is another – perhaps like the language of Wittgenstein's shopkeeper,7 where names (at least appear to) map onto their referents in a robust, realist relation.

Conclusion

Philosophy and engineering, then, are not such unlikely bedfellows. There is much scope for philosophy to inform engineering practice, especially in its most difficult problems, and greater scope for engineering to inform philosophical questions and set new ones. However, it is clear that philosophers must embrace a new method to see these advantages. They must be willing to engage with practical problems, and not just in a priori reasoning, and be open to learning from artefacts as well as concepts and arguments. Most of all they must be willing to engage with the world on a practical level and adopt some of the engineers' drive to change the world as a result of their work.

References

Abass, Z. K., Al-Abedi, T. K., & Flayyih, H. H. (2023). Integration between Cobit and Coso for Internal Control and Its Reflection on Auditing Risk with Corporate Governance as the Mediating Variable. International Journal of Economics and Finance Studies, 15(2), 40-58. doi: https://doi.org/10.34111/ijefs. 202315203

Aidi, I. S., Ali, Z. N., & Flayyih, H. H. (2023). Is It Possible To Adopt A Budget Of Performance In The Iraqi Government Companies?. International Journal of Professional Business Review, 8(5), e01735. https://doi.org/10.26668/businessreview/2023.v8i5.1735

Ali, S. I., Al-taie, B. F. K., & Flayyih, H. H. (2023). The Effects of Negative Audit and Audit Environment on the Internal Auditor Performance: Mediating Role of Auditing Process Independence. International Journal of Economics and Finance Studies, 15(1), 64-79. doi: https://doi.org/10.34111/ijefs.2022315104

Almagsoosi, L. Q. K., Abadi, M. T. E., Hasan, H. F., & Sharaf, H. K. (2022). Effect of the volatility of the crypto currency and its effect on the market returns. Industrial Engineering & Management Systems, 21(2), 238-243.

Alwan, S. A. (2022). Role of the Learned Helplessness in Diminishing the Precision of Jump Shooting For Young Basketball Players. Revista iberoamericana de psicología del ejercicio y el deporte, 17(3), 91-93.

Alyaseri, N. H. A. (2021). Optimization of the challenges facing the Iraqi economy based on the values of returns in 2000-2020. Економічний часопис-XXI, 194(11-12), 4-12.

Alyaseri, N. H. A., Abbas, I. K., & Askar, W. I. (2022). Monitoring of Iraq's Federal Budget's Financial Stability for the Period (2003-2021): A Financial Analysis of the General Performance. Industrial Engineering & Management Systems, 21(4), 557-564.

Alyaseri, N. H. A., Shandi, A. Q., & Khuzam, R. N. (2023). An Econometrics Analysis on the Effect of the Public Budget Deficit on Foreign Reserves in

Iraq for the Period from 1990-2020. Industrial Engineering & Management Systems, 22(1), 10-19.

Ashham, M., Sharaf, H. K., Salman, K., & Salman, S. (2017). Simulation of heat transfer in a heat exchanger tube with inclined vortex rings inserts. International Journal of Applied Engineering, 12(20), 9605-9613.

Hadi, A. H., Ali, M. N., Al-shiblawi, G. A. K., Flayyih, H. H., & Talab, H. R. (2023). The Effects of Information Technology Adoption on the Financial Reporting: Moderating Role of Audit Risk. International Journal of Economics and Finance Studies, 15(1), 47-63. doi: https://doi.org/10.34111/ijefs.2022315104

Maseer, R. W., Zghair, N. G., Flayyih, H. H. (2022). Relationship between Cost Reduction and Reevaluating Customers' Desires: The Mediating Role of Sustainable Development. International Journal of Economics and Financial Studies. Vol. 14 No. 4. 330-344. doi: https://doi.org/10.34111/ijefs.20220116

Mohammed, N. B., & Kzar, M. H. (2021). The effect of the use of exploratory exercises in improving concentration of attention and skills of chest handling and correction of basketball stability for people with special needs. Revista iberoamericana de psicología del ejercicio y el deporte, 16(4), 7.

Mouhmmd, L. T., Rahima, M. A., Mohammed, A. M., Hasan, H. F., Alwan, A. S., & Sharaf, H. K. (2023). The effect of firm type on the relationship between accounting quality and trade credit in listed firms. Corporate & Business Strategy Review, 4(2), 175–183. https://doi.org/10.22495/cbsrv4i2art16

Raheemah, S. H., Fadheel, K. I., Hassan, Q. H., Aned, A. M., Al-Taie, A. A. T., & Kadhim, H. (2021). Numerical Analysis of the Crack Inspections Using Hybrid Approach for the Application the Circular Cantilever Rods. Pertanika Journal of Science & Technology, 29(2).

Salim, A. T., Kareem, M. A., & Alwan, S. A. (2022). The effect of (HIT) training on immune globulins and white blood cells for amateur weightlifters after the return of activity from the mandatory quarantine for the Covid-19 epidemic. Revista iberoamericana de psicología del ejercicio y el deporte, 17(5), 328-331.

Salman, S., Sharaf, H. K., Hussein, A. F., Khalaf, N. J., Abbas, M. K., Aned, A. M., ... & Jaber, M. M. (2022). Optimization of raw material properties of natural starch by food glue based on dry heat method. Food Science and Technology, 42.

Sharaf, H. K., Alyousif, S., Khalaf, N. J., Hussein, A. F., & Abbas, M. K. (2022). Development of bracket for cross arm structure in transmission tower: Experimental and numerical analysis. New Materials, Compounds and Applications, 6(3), 257-275.

Subhi, K. A., Hussein, E. K., Al-Hamadani, H. R. D., & Sharaf, H. K. (2022). Investigation of the mechanical performance of the composite prosthetic keel based on the static load: A computational analysis. Eastern-European Journal of Enterprise Technologies, 3(7), 117.

Talab, H. R., & Flayyih, H. H. (2023). An Empirical Study to Measure the Impact of Information Technology Governance Under the Control Objectives for Information and Related Technologies on Financial Performance. International Journal of Professional Business Review, 8(4), e01382. https://doi.org/10.26668/businessreview/2023.v8i4.1382

Taresh, S. A., & Alwan, S. A. (2022). Some Major Biomechanics Factors and Their Link to Vertical Punch Response Speed from the Bottom of the Young Boxing Players. Revista Iberoamericana De Psicología Del Ejercicio Y El Deporte, 17(6), 365-367.