Abstract and References. Control processes

DEVELOPMENT OF MODELS AND IMPROVEMENT OF METHODS FOR FORMALIZATION OF DESIGN PROBLEMS AND AUTOMATING TECHNICAL AND OPERATIONAL WORKS OF RAILWAY STATIONS (p. 6–16)

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The object of research is the processes of automation of the technical and operational assessment of railway stations (RWS). Research solves the problem of developing models, methods and information technologies to automate the process of technical and operational assessment of the work of RWS.

As a result of the study, the following results were obtained: Analysis of scientific papers on the problem of automating the work of RWS. Development of new method and mathematical models to automate the task. Development of new descriptions for the technological processes (TechP) of the RWS based on visual programming methods. Development of simulation models for the automation of railway infrastructure management task.

The UML diagrams of state and activity have been adapted in order to represent the RWS operation technology. When formalizing the description of the RWS, the state diagrams are submitted taking into account the specifics of the description of the change in the phases of servicing objects in the process of TechP of individual objects maintenance.

It is shown that the state diagram for the RWS is a state machine (SM) that models the sequence of changing the states of an object. The detailing of the behavior of objects serviced at the RWS has been completed. Detalization is performed using diagrams of activity. The diagrams of activity are used to formally describe the technical support with objects and executors of work on the railway.

The scientific results obtained in the article, as well as new and improved models and methods, can be used in the development, improvement and formalization of the TechP of the RWS, research methods for informatization and automation objects on the railways of the Republic of Kazakhstan.

Keywords: design automation, railway station, technical and operational assessment, technological processes, automated control system.

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The object of this study is a regulated intersection of city streets. The main task being solved is the reduction of queue lengths on approaches to such intersections by organizational measures. As a result of the research, patterns of change in queue lengths in front of the stop line were revealed, taking into consideration the specialization of traffic lanes and the distribution of traffic flows by directions. It was established that with an increase in the share of left-turning vehicles in the lane by 15% and above, there is an increase in the length of the queue before the intersection from 45 to 80 m. The results indicate that when choosing a traffic pattern at the intersection, it is necessary to take into consideration not only the intensity of traffic flow itself but also the proportion of vehicles performing certain maneuvers (in this work, turning left is considered).

A feature of the results is that they are obtained using simulation tools. This research method has made it possible to derive the value of the length of the queue in front of the intersection, changing the load on the approach from 200 to 1000 vehicle/h and the share of left-turning vehicles from 5 to 15%. In addition, using a simulation model, it was checked how the intersection functions under various traffic management schemes on it when the input parameters of traffic flows change.

The research results are recommended to be used in the development of traffic management schemes at regulated intersections. When determining the permitted directions of movement in the lanes, it is necessary to take into consideration the patterns of change in the length of queues before the intersection since under certain circumstances they may exceed critical values.

**Keywords:** traffic flow, regulated intersection, simulation modeling, queue length, traffic safety.

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**DOI:** 10.15587/1729-4061.2022.263651

**PREDICTION MODEL OF MOTORCYCLE ACCIDENT IN ECONOMIC AND DRIVING BEHAVIOUR FACTORS (p. 27–33)**

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The number of motorized vehicles, especially motorcycles, is also offset by increased traffic accidents. As is known, road accidents essentially depend on four interrelated factors: human behavior, vehicle efficiency, environmental conditions, and the characteristics of the infrastructure. However, most accidents are attributable to the first three factors, almost always to improper user behavior. This study aims to determine motorcyclists’ socio-economic characteristics and conduct on the intensity of accidents. The research location is on the Pandean-Purwosari National Road, Pasuruan Regency, Section 994-998 (Surabaya-Malang). Three hundred forty respondents are motorcyclists who have experienced accidents in this segment. The research method is interviews and questionnaires — data analysis using Structure Equation Modeling (SEM), with software SmartPLS (Partial Least Square).

The result of accident modeling \( Y = 0.299X_1 + 0.154X_2 + 0.077X_3 + 0.54X_4 \). The first biggest influence on the chance of anaccident...
dent is the characteristics of driving behavior (X4) exceeding speed (X4.10). The more often the rider exceeds the rate, the higher the chance of an accident. The second most significant influence of socio-economic characteristics (X1) is the age indicator (X1.2), the more mobility in the productive age, the higher the risk of accidents.

**Keywords:** traffic accidents, motorcyclist, behavior, demographics characteristics, structural equation modeling (SEM), SmartPLS (Partial Least Square).

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This paper considers the need to transform logistics systems into eco-logistics ones in order to achieve environmental goals of sustainable development. It was determined that one of the ways to reduce the eco-destructive impact of eco-logistics systems on the environment is the use of project management methodology tools and making changes to the project life cycle by including ecologically oriented phases. The products obtained during the life cycle of an eco-logistics system project have been identified and the links between the products of individual phases of the project have been established.

The object of this study is the method of managing the configuration of products of the eco-logistics system project, which includes three stages: product parameter specification, product clustering, and structuring of the project’s product clusters. A description of each stage is provided.

The specification of product parameters is to create descriptive frame models of products that contain the parameters necessary to characterize the product phase of the project, which are reflected in the content of the project’s products. Product clustering involves the creation of information models of product clusters that contain information about the set of products of the project phases that have close parameter values. Structuring clusters of project products leads to the creation of a network of clusters between which connections are formed, which makes it possible to build a product configuration.

Experimental calculations confirming the adequacy of the application of the proposed method of managing the configuration of products of the eco-logistics system project are presented. As a result, a network of clusters of project products has been created, using which makes it possible to synthesize product chains that would have maximum value in terms of complying with eco-logistics rules and could minimize the negative impact on the environment.

**Keywords:** eco-logistics system, project life cycle, product content, project product configuration.

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DOI: 10.15587/1729-4061.2022.263285
DEVELOPMENT OF COMPREHENSIVE DECISION SUPPORT TOOLS IN DISTANCE LEARNING QUALITY MANAGEMENT PROCESSES (p. 43–50)

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The object of this study is the quality of distance learning. The need for procedures to assess the quality of this form of education was manifested most clearly in connection with the COVID-19 pandemic, wars, and other global problems, which predetermine the relevance of the study.

The study considers the construction of a decision support model for assessing the quality of distance learning. Underlying the method is a combination of the method of expert assessments and the criterion model of data analysis, the basic method for analyzing the data obtained is the method of hierarchy analysis.

Structural and functional schemes of the quality management system for distance learning are proposed. During the study, 10 criteria and 52 indicators were selected, and the weight of each indicator was calculated. Based on the weight values obtained, a scheme of the criteria model of decision support was built to assess the quality of distance learning.

During the expert evaluation of the criteria and indicators, it was determined that the weight of indicators within the criterion ranges from 0.99953 to 0.34262. Such a difference in weight values indicates the optimality of the set of indicators within the criterion.

Due to the combination of a criteria-based approach to data analysis in combination with the method of expert assessments, the model can be easily adapted for a point assessment of individual components and finding problem areas in the implementation of distance learning and management decision-making.

The results of the study reported here may be of interest to both heads of educational institutions and employees of services involved in processing information about the organization and reporting for strategic decision-making.

Keywords: quality assurance, expert assessment, distance learning, criterion model, method of expert assessments, method of analysis of hierarchies, combination of methods.

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The object of this study is the management processes of sustainable construction. Sustainability is considered through the application of management processes that, in addition to the traditional tasks for construction projects, also outline the tasks of a wider context. Strategies and production practices of sustainable construction involve taking into account environmental, social and economic factors that affect a wide range of stakeholders and the overall condition of the built space. In this regard, the issue of applying management processes in the construction industry that ensure proper organizational and technological sustainability of projects is also being updated. This article aims to fill the existing information and methodological gap in the processes of assessing the sustainability of construction project management processes.

A correlation method was applied to determine the interdependencies of the characteristics of the use of tools and methods in the processes of managing construction projects with the values of sustainable development 5P (Product, Process, People, Planet, and Prosperity). Highlighting the characteristics of permanence in project management processes helps to explain the differences in approaches for ensuring the internal sustainability of the construction object and the sustainable management of a construction project.

A comprehensive methodology for quantitative assessment of sustainable construction project management in the initiation and planning phases under conditions of uncertainty is proposed. The relative importance of construction project management processes and subcategories of sustainable development of the construction site is taken into account. Basic mathematical models of sustainability assessment have been developed: balanced in all areas of knowledge of construction project management for each process, balanced across all construction project management processes at the «Initiation» and «Planning» phases for each category of sustainable development, and integral assessment of sustainability of construction project management processes.

Keywords: project management, construction project, sustainability, sustainable development, planning processes.

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Ob’єктом дослідження є процеси автоматизації техніко-експлуатаційної оцінки залізничних станцій (ЗС).

Дослідження вирішують завдання розробки моделей, методів та інформаційних технологій для автоматизації процесу техніко-експлуатаційної оцінки роботи ЗС.

У результаті дослідження було отримано такі результати: Аналіз наукових праць з проблем автоматизації роботи ЗС. Розробка нового методу та математичних моделей для автоматизації завдання. Розробка нових описів технологічних процесів (ТП) ЗС на основі методів візуального програмування. Розробка імітаційних моделей для вирішення задач автоматизації управління залізничною інфраструктурою.

Діаграми стану та активності UML були адаптовані для представлення технології роботи ЗС. При формалізації опису ЗС діаграми станів представляються з урахуванням специфіки опису зміни фаз обслуговування об’єктів в процесі ТП обслуговування окремих об’єктів.

Показано, що діаграма станів для ЗС є кінцевим автоматом (КА), моделюючим послідовність зміни станів об’єкта. Виконали деталізацію поведінки об’єктів, що обслуговуються на ЗС. Деталізація здійснюється з допомогою діаграм діяльності. Схеми діяльності використовуються для формального опису технічного забезпечення об’єктів та виконання робіт на залізниці.

Наукові результати, отримані у статті, а також нові та вдосконалені моделі та методи можуть бути використані при розробці, удосконаленні та формалізації ТП ЗС, методів дослідження об’єктів інформатизації та автоматизації на залізницях Республіки Казахстан.

Ключові слова: автоматизація проектування, залізнична станція, техніко-експлуатаційна оцінка, технологічні процеси, автоматизована система керування.
ймовірність аварії. Другим за значимістю впливом соціально-економічних характеристик (Х1) є віковий показник (Х1.2), чим більша рухливість у працездатному віці, тим вищий рівень нещасних випадків.

Ключові слова: дорожньо-транспортні пригоди, мотоцикліст, поведінка, демографічні характеристики, моделювання структурних рівнянь (SEM), SmartPLS (Partial Least Square).

DOI: 10.15587/1729-4061.2022.261956

РОЗРОБКА МЕТОДУ УПРАВЛІННЯ КОНФІГУРАЦІЄЮ ПРОДУКТІВ ПРОЄКТУ ЕКОЛОГІСТІЧНОЇ СИСТЕМИ (с. 34–42)

С. В. Руденко, Т. А. Ковтун, В. Ю. Смрковська

Висвітлено проблему необхідності перетворення логістичних систем у екологістичні заради досягнення екологічних цілей сталої громадської політики. Встановлено, що одним з ключових факторів ефективності управління навчальним процесом є застосування екологічних методів управління проектами.

Основою методу є розроблення моделі конфігурації продуктів проєкту екологічної системи з використанням інструментарію методології системного аналізу (SEM) та програмування SmartPLS (Partial Least Square).

DOI: 10.15587/1729-4061.2022.263285

РОЗРОБКА КОМПЛЕКСНОГО ІНСТРУМЕНТА ПІДТРИМКИ ПРИЙНЯТТЯ РІШЕНЬ У ПРОЦЕСАХ УПРАВЛІННЯ ЯКІСТЮ ДИСТАНЦІЙНОГО НАВЧАННЯ (с. 43–50)

Anna Shaporeva, Oxana Kopnova, Irina Shmigirilova, Yevgeniya Kukharenko, Aliya Aitymova

Об’єктом дослідження є якість дистанційного навчання. Потреба в методиках оцінки якості цієї форми навчання проявилася найбільш явно у зв’язку з пандемією COVID-19, війнами та іншими глобальними проблемами, що і є актуальністю дослідження.

Дослідження призвело до розробки моделі, що враховує якість інформаційної бази даних, збалансованість методів аналізу, вплив експертних оцінок, а також комплексний підхід до оцінки якості дистанційного навчання.

DOI: 10.15587/1729-4061.2022.263668

УДОСКОНАЛЕННЯ МОДЕЛЕЙ ОЦІНКИ СТАЛОГО УПРАВЛІННЯ БУДІВЕЛЬНИХ ПРОЄКТІВ У ПРОЦЕСАХ ІНІЦІАЦІЇ ТА ПЛАНУВАННЯ (с. 51–66)

Т. Г. Фесенко

Об’єктом дослідження є процеси управління «стійким будівництвом». Сталість розглядається через застосування управлінських моделей, що враховують екологічні, соціальні та економічні фактори, які впливають на стан забудованих територій.

Ключові слова: забезпечення якості, екологічна оцінка, моделювання, структурні рівняння (SEM), підходи до управління.

DOI: 10.15587/1729-4061.2022.265668
сувації у будівельній індустрії управлінських процесів, щоб забезпечувати належну організаційну та технологічну стійкість проектів. Ця стаття має на меті заповнити наявну інформаційно-методичну прогалину в процесі оцінювання сталості процесів управління будівельними проектами.

Застосовано кореляційний метод для визначення взаємозалежностей характеристик застосування інструментів та методів в процесах управління будівельними проектами із цінностями сталого розвитку 5Р (Product, Process, People, Planet, Prosperity). Вивчення характеристик сталості в процесах управління проектом дозволяє пояснити відмінність підходів для забезпечення внутрішньої стійкості об’єкту будівництва та сталого управлінням будівельним проектом.

Запропоновано комплексний інструментарій кількісного оцінювання сталого управління будівельним проектом у процесі ініціації та планування в умовах невизначеності. Враховується відносна важливість процесів управління будівельним проектом та субкатегорій сталого розвитку об’єкту будівництва. Розроблено базові математичні моделі оцінки сталості: збалансованої пауза областям знань управління будівельним проектом для кожного процесу; збалансованої по усім процесам управління будівельними проектами на фазі «Ініціація» і «Планування» для кожної категорії сталого розвитку; інтегральної оцінки сталості процесів управління будівельним проектом.

Ключові слова: управління проектами, будівельний проект, стійкість, сталий розвиток, процеси планування.