Support System of Solutions for Planning Sales Activities in the Tourism Industry

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Abstract*: *The problems of creating methodologies and analytical models for decision support for planning and forecasting operational activities are compounded by the vast majority of tourism companies due to industry specifics and are currently not fully developed due to the current level of business planning, the traditional commitment of company management to administer and situational management, the prevalence of a retrospective approach to analysis over-promising, low quality and similar data of managerial accounting for the formation of a reliable operational "fact", as well as weak formalization and automation of the in-house process of financial and economic planning and forecasting based on information and analytical systems. The developed decision support system for marketing planning in the tourism industry and the supporting algorithm incorporates the functionality of sliding adaptive planning of daily revenue, which can significantly reduce the information gap between the strategic and operational levels of tourism company management and significantly improve the quality of the generally accepted process of budget marketing of sales. As a result, the decision support system not only takes into account the features of the typical process of corporate marketing planning but also allows you to design a system of dynamic planning and to forecast the marketing activities of a travel company with improved properties of efficiency, accuracy and adaptability.

Keywords : IAS DSS, Planning, Sales Activities, Solutions, Support System, Tourism Industry.

I. INTRODUCTION

In the context of the global digital revolution and the rapid development of the world economy, one of the most important conditions for the successful survival and development of companies as economic entities is ensuring high-quality planning and forecasting of sales results, which directly depends on the models, methods and systems used to support decision-making.

According to global forecasts, "rapid changes" and uncertainty in the economic environment will increase in the coming decades, which is an essential point in the implementation of short-term and medium-term policies in the field of financial and economic management of the company. The problem of creating methodologies and analytical models for decision support for planning and forecasting operational activities is compounded by the vast majority of tourism companies due to industry specifics and is currently not fully developed due to the current level of business planning, the traditional commitment of company management to administer and situational management, the prevalence of a retrospective approach to analysis over-promising, low quality and similar managerial accounting data for the formation of a reliable operational "fact", as well as weak formalization and automation of the in-house process of financial and economic planning and forecasting based on information and analytical systems.

In practice, to solve short-term and medium-term planning tasks, rolling budgeting and forecasting methods (rolling forecast) are traditionally used, which involve the calculation of forecast indicators of financial and economic activities on an annual horizon, disaggregated by quarters and months based on the accumulated history of operations and actual results of the accounting period ended respectively [1-4]. Market participants actively use rolling forecast methods as part of the intra-company budget process, but their application, as a rule, is local, poorly formalized, static and fragmented, is not accompanied by scenario analysis taking into account external factors of influence and does not allow decision-makers to implement a holistic corporate planning system. Moreover, the factual analysis of the specified budget process often relies on untimely historical accounting data and inaccurate management accounting data.

We also consider it important to note that in business practice, the main information tools for technological support of such a budget process are “flat” MS Excel spreadsheets, which due to their functionality do not fully satisfy the requirements for dynamic multi-aspect analysis, as well as teamwork and data security, and, accordingly, they cannot provide the level of automation of the process of corporate planning of tourism business companies that are currently required.

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Due to the reasons mentioned above, the possibility of rolling forecasting, multi-aspect analysis, scenario modelling and several other methods are used insignificantly in in-house planning, which negatively affects the quality of short-term and medium-term forecast indicators of financial and economic activity [5-7]. This leads to managerial errors and untimely decisions and, as a result, to a decrease in the operational efficiency of the tourism business [8-10].

II. DEVELOPMENT OF A DECISION SUPPORT SYSTEM FOR MARKETING PLANNING IN THE TOURISM INDUSTRY

A. Existing methodological approaches and analytical methods for forecasting the results of marketing activities of a travel company

In practice, methodological approaches and analytical methods for predicting the results of the company's sales activities are based primarily on the methods of financial analysis, budgeting and controlling, as well as expert and economic-statistical modelling methods (Table 1).

Table- I: Name of the Table that justifies the values

Typical Forecasting Approaches	Prediction Tools and Forms	Applicable Methods
Expert estimates	▪ point forecast ▪ interval forecast ▪ probability distribution forecast	▪ Delphi Method ▪ Different forecast weighting methods
Analysis and prediction of time series	▪ trend analysis	▪ The enlargement of the time series interval ▪ Moving average ▪ Analytical alignment ▪ Different smoothing methods
	▪ seasonality analysis	▪ Seasonality Index Calculation ▪ Exponential smoothing method
	▪ cyclic change analysis	▪ Analysis of market fluctuations (large and small cycles)
	▪ random change analysis	▪ Mathematical Statistics Methods
Casual methods	▪ economic and mathematical modelling ▪ multivariate analysis ▪ comprehensive economic analysis	▪ Correlation Regression Analysis ▪ Methods of researching the dynamics of leading indicators ▪ Methods of researching consumer intentions ▪ System dynamics modelling
	▪ financial analysis methods	▪ budgeting and controlling ▪ financial math ▪ coefficient analysis

Under the conditions of “rapid changes” in the external environment, none of the forecasting methods discussed above can guarantee the stable quality of the corporate planning of a travel agent or operator.

One of the promising, in our opinion, is an integrated approach to forecasting based on the joint use of expert, economical, mathematical and information-analytical modelling methods. In this case, the information approach to forecasting (data-driven model) and scenario analysis of the influence of factors on useful indicators can improve the adaptive properties of forecast models.

B. Information and analytical decision support systems in the field of corporate sales planning

The development of knowledge and analytical systems of different classes is based on economic, mathematical and intellectual methods of analysis and forecasting, which are based on the developers of the information and systematic decision support system [4-5]. In a generalized form, the relationship of methods and technologies can be illustrated in Fig. 1.

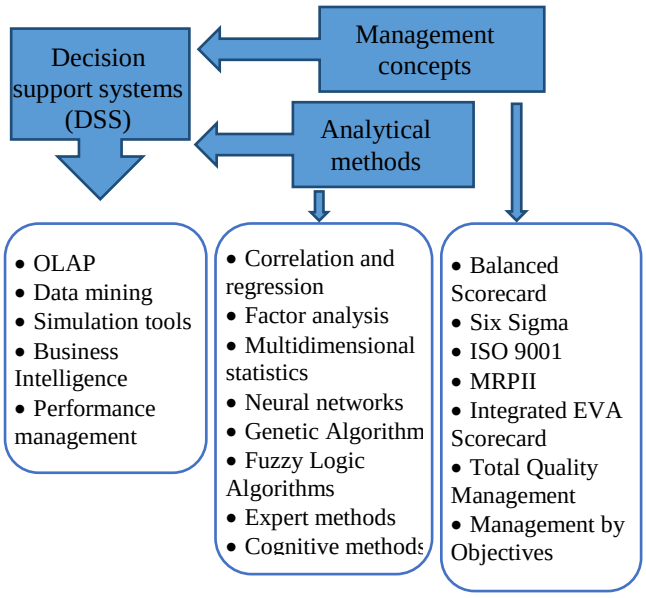

Fig. 1. The relationship of managerial concepts, analytical methods and instrumental solutions IAS DSS.

As shown in Fig. 1, information-analytical systems based on business analytics (IAS DSS) use the results of the evolutionary development of a number of managerial concepts and intelligent data analysis methods.

Given the urgent tasks of corporate planning, as well as existing analytical methods and concepts, we distinguish the following types of IAS DSS:

- Systems of simulation tools;
- Specialized expert systems;
- Corporate performance management systems;
- Business intelligence systems.

An important point in the design of the IAS PPR of this class for corporate planning tasks is that business analysis platforms with OLAP applications and OLAP objects included in them do not only cancel traditional OLTP systems (ERP, budgeting systems, spreadsheets), but they are a complementary solution, involving the joint use of accounting and analytical circuits IAS DSS.

A generalized example of the frequent use of accounting (OLTP) and analytical (OLAP) components of the IAS PPR of a business intelligence system [3] is shown in Fig. 2.

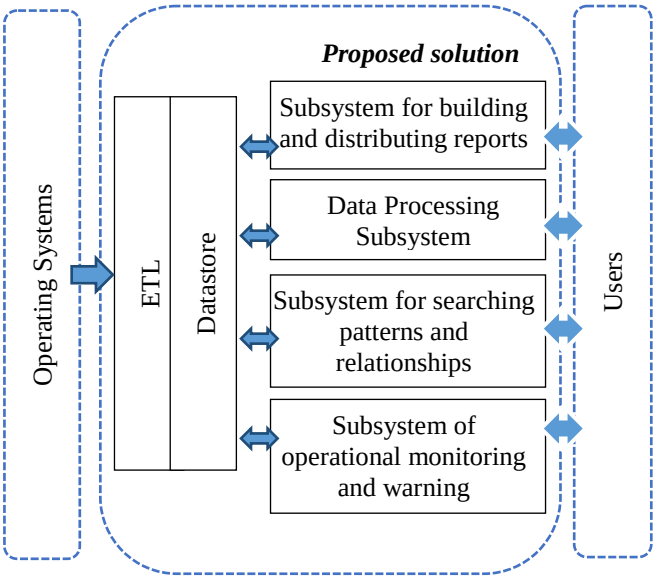

Fig. 2.Target architecture of BI-solutions.

C. Double-circuit information and logic scheme for planning sales indicators of a corporation with feedbacks (ILS)

In the new economic conditions, the traditional business process of corporate sales planning does not fully meet the specified quality criteria (efficiency, accuracy, adaptability). This is due to both the previously considered corporate-wide problem of the information gap between levels 1 and 2, and the features of a typical business process for planning and forecasting income, shown in Fig. 3.

As can be seen from Fig. 3, in the diagram, it is conditionally possible to distinguish three vertical zones that affect the quality of the result:

1) Zone 1 –zone of formation of sales indicators (revenue planning);

2) Zone 2 – zone of formation of the revenue plan (revenue planning):

3) Zone 3 – income plan adjustment (revenue forecasting).

Zone 1 reduces the quality of sales planning due to the formation of insufficiently substantiated values of sales targets, as well as through the use of untimely and inaccurate data on actual sales figures. Zone 2 additionally reduces the quality of sales planning due to the use of insufficiently substantiated mark-up indicators obtained by experts in the calculations and sales indicators based on automatic preliminary estimates of "achieved". Thus, the budget of commodity-gross income (TVD) already includes systematic planning errors by decision-makers. Zone 3 of the business process under consideration is intended for operational adjustment of the generated revenue plan based on the Plan-Fact analysis, however, improving the quality of planning in Zone 3 is possible only if high forecasting quality is achieved, which, in turn, depends on the methods used, and from the forecasting step. Traditionally used by companies in the corporate sector of the economy, rolling budget planning of sales activities in 1-month increments solves this problem with a 20-30% deviation of the “Fact” from the “Plan”. As a result, within the framework of the described business process, the existing budget models are based on a retro-analysis of Plan-Fact and do not take into account operational changes in the external environment, which leads to the so-called “information gap” between the strategic and operational levels of corporate governance.

The theoretical and practical aspects of the considered sales planning process were investigated from the informational, managerial and economic side in accordance with the Howard Dresner Corporate Performance Management (CPM) concept [11], which involves ensuring a continuous cycle of corporate performance management by building a system planning, forecasting, analysis and control with a minimum delay in feedback feedback, as shown in Fig. 4.

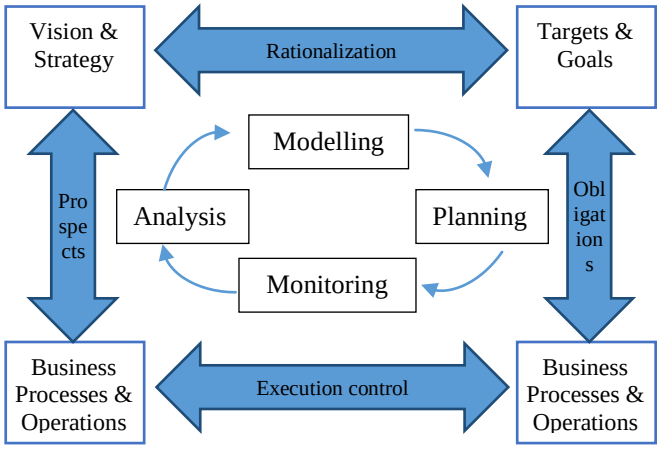

Fig. 3.Target architecture of BI-solutions.

This concept combines the business processes, methodologies, metrics and systems necessary for the continuous measurement and management of organizational performance. As part of the development of this concept and in relation to the sales activities of the corporation, a double-circuit information-logic diagram (ILD) for planning indicators of the sales activities of the corporation with feedback was developed, which allows us to bring the corporation management process closer to continuous (Fig. 5). The internal (small) control loop (blocks 2-3-4, Fig. 3) provides scenario modelling as part of short-term planning (day-week-month), the external (large) control loop (blocks 1-4, Fig. 3) supports a large medium-term planning cycle (month-quarter-year) with the possibility of adjusting budget sales plans and the company's sales strategy. ILS differs from analogues by introducing into the internal circuit a unit for calculating forecast growth rates of daily revenue and a scenario modelling unit. Their consistent and cyclical use allows decision-makers to increase the accuracy and efficiency of the forecast through the use of scenario analysis of "what if?" And automatic correction of the rising trend, taking into account the confirmed fact. 51 In accordance with the considered ILS scheme, the process of corporate planning and forecasting the sales activities of a corporation includes the stage of generating sales targets (step 1.1), the stage of modeling the forecast growth rates for revenue and margins (steps 1.2-2.2), the stage of generating indicators for the basic budget of the commodity gross income and cost, taking into account the forecast growth rates and adjusting the "anomalies" (step 2.3), the stage of scenario modeling of sales indicators taking into account the adjustment of the

base budget of the theater of operations "with erhu-down "(steps 3.2-3.3), the step of forming the HPT trend forecasting method and purpose of the method (steps 4.2-4.3), and the step of calculating forecasted sales graphics visualization system performance indicators (step 4.4). To improve the quality of this business process as a whole, it is necessary to improve the quality of information and analytical support for planning and forecasting in each of the identified zones. In our opinion, this is achievable in the case of the joint application of trend, information and scenario methods of predictive modelling.

The trending method with rolling forecasting of growth in sales indicators allows you to calculate the daily and monthly seasonality of sales. The information method of data management using feedbacks enables you to take into account the daily actual sales results, improving the adaptive properties of settlement trends. Scenario analysis based on OLAP modelling allows the decision-maker to increase the validity of adjusting the plan indicators taking into account the received fact and the calculated forecast. The enlarged algorithm for the dynamic planning of sales indicators based on HLS is presented in Fig.

In the business practice of corporate governance, the analytical support of DSS is intimately connected and practically inseparable from its information support. In the organizational and technological management systems, which include the developed DSS, the role of the human factor and the associated information factor is enormous. A decrease in the quality of input information in sales forecasting, as a rule, makes the mathematical model unsound.

For this reason, when developing DSS, both the information factor (using feedbacks and trend adjustments) and the human factor (based on scenario modelling) were taken into account. Explanations for the dynamic planning algorithm presented in Fig. 3 are given in Table 1.

Table- I: The software of the ILS

Design components of the ILS	Description
Multiplicative model of absolute revenue growth	$Y = T * S_d * S_m$ (1)
Sales forecast by incremental method	$Rk = [Y0 + \sum Yi\ k\ i=1\ ] \bullet [(1+Kplan/100) / (1+Kfact/100)]$ (2)
Full recalculation of the rolling forecast for the k-th day	$TVDforecast = [Y0+\sum Y2i\ n\ i=1 +\sum Yi\ k\ i=n+1\ ] \bullet [(1+Kplan/100) / (1+Kfact/100)]$ (3)
Adjustment of the Plan to Fact and Forecast	$TVD\ accepted = TVDfact\ TVDforecast \bullet TVDplan$ (4)

When modelling according to (1-4), the following conditions are satisfied:

1) The multiplicative model (1) of the absolute revenue growth Y (t) takes into account the linear trend (T), daily seasonality (Sd), monthly seasonality (Sm). The linear trend T is calculated using the OLS method taking into account smoothing based on the “three sigma rule”, the seasonal component Sd is considered as the seasonality of the day of the week with a cycle of 7 days, the seasonal component Sm is considered as the seasonality of the month of the year with a cycle of 12 months.

2) The forecast of sales indicators (2) of the current year (Rk) at the k-th observation step is calculated on an accrual basis taking into account the actual value of sales indicators for the day preceding the start of planning (Y0), and the correction factors for planned anomalies (Kplan) and actual (Kfact) The fact of the current year 54 means the daily result of sales activities with the accumulated total (Y2), which is used to recalculate the TVDforecast forecast, where: n is the number of observations confirmed by the current fact ($1 \le n \le k$); Y2i - fact on the i-th day of the planning period, i = 1, 2 ... n; Yi - forecast for the next days of the planning period (i = n, (n + 1), (n + 2) ... k).

3) Based on the current fact, a complete recalculation of the time series (3) to a depth of 730 days is performed. Taking into account smoothing, seasonality and anomalies, the forecast of sales indicators is daily adjusted in the rolling forecasting mode in 1-day increments. A new fact at the current date replaces the forecast, and the remainder of the forecast time series of the theatre of operations indicators is recounted in its entirety.

4) Scenario modelling of the TVD budget (TVDaccepted) in accordance with (4) provides decision makers with an additional opportunity to compare and adjust the indicators of the initially approved planned budget (TVDplan) taking into account the calculated forecast of TVDforecast and the accumulated fact of TVDfact.

Full planning cycles and budget adjustments for the presented double-circuit HLS of a typical corporation during the planning year include:

1) Formation and coordination of the Strategic Budget (external control loop);

2) Creation and coordination of the Main budget (internal control loop);

3) Formation and coordination of operational budgets (internal control loop).

The sales performance indicators of the Strategic (annual) budget of the planning year are calculated based on historical data (fact) of past years, taking into account regulatory and reference information and selected planning scenarios. Adjustments to the Main (quarterly) budget are made based on the Strategic Budget, taking into account the actual revenue indicators of the ended period (quarter). The operating budget is adjusted, taking into account the current fact of marketing activities.

III. RESULT AND DISCUSSION

Thus, the developed decision support system for marketing planning in the tourism industry and the supporting algorithm incorporates the functionality of sliding adaptive planning of daily revenue, which can significantly reduce the information gap between the strategic and operational levels of tourism company management and significantly improve the quality of the generally accepted process of budget marketing of sales. As a result, the decision support system not only takes into account the features of the typical process of corporate marketing planning but also allows you to design a system of dynamic planning and to forecast the marketing activities of a travel company with improved properties of efficiency, accuracy and adaptability.

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