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The quality of performance measurement systems at the Estonian Ministry of Agriculture

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Abstract

The goal of this study is to assess the quality of the PMS at the Estonian Ministry of Agriculture by analyzing whether the PMS meets certain requirements. The requirements applicable to the PMS could be split into two categories: system requirements and measure requirements. The research particularly focuses on the system requirements, such as balance, the cause-effect model, linkage to strategy, and multidimensionality.

The authors use the archival research strategy in order to uncover the origins of the design of the current PMS and to describe the current state of affairs regarding PM in the public sector in Estonia. Secondary data, documentation publicly available from the web portals of the Ministry of Finance and the Ministry of Agriculture of Estonia, is the main source of information. Content analysis is used to carry out the study of the current PMS of the ministry.

Based on the analysis made we can conclude that although the measurables are not distributed homogeneously among the categories, all the defined categories are covered. The PMS at the Ministry of Agriculture demonstrated a relatively good level of compliance with the requirements applicable to a modern PMS. However, the following recommendations are offered based on the results of the research:

- split measurables in such a way that they would only represent a single area of performance,
- review measurables that cannot be assigned to any of the defined categories,
- consider improving the cause-effect model by separating inputs and outputs represented by actions.

Keywords: performance measurement systems, ministry, system requirements, measure requirements.

Streszczenie
Jakość systemu pomiaru dokonań Ministerstwa Rolnictwa w Estonii

Celem artykułu jest ocena jakości systemu pomiaru dokonań w Ministerstwie Rolnictwa w Estonii poprzez ustalenie, czy system spełnia określone regulacje. Regulacje te można podzielić na dwie kategorie: wymagania systemowe, jak np. powiązanie ze strategią, model przyczynowo-skutkowy, wielowymiarowość oraz wymagania dotyczące samego pomiaru.

Autorzy przeprowadzili badania na danych archiwalnych w celu ustalenia pochodzenia wzorców dla obecnie stosowanego pomiaru dokonań w sektorze publicznym w Estonii. Wykorzystane zostały głównie źródła wtórne, dokumentacja publicznie dostępna na stronach internetowych Ministerstwa Finansów oraz

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Ministerstwa Rolnictwa w Estonii. Analiza treści została zastosowana do oceny obecnego systemu pomiaru dokonań ministerstwa.
Wyniki analizy wskazują, że mimo nierównomiernego i niehomogenicznego rozłożenia mierników wszystkie kategorie zostały uwzględnione. System pomiaru dokonań Ministerstwa Rolnictwa w Estonii został oceniony na wysokim poziomie pod względem zgodności z wymaganiami dla nowoczesnych systemów pomiaru wyników. Mimo to zostały sformułowane następujące rekomendacje:
– mierniki powinny być tak skonstruowane, aby mierzyły jedno zjawisko/obszar,
– należy odrzucić mierniki, które nie pasują do żadnej kategorii,
– należy rozważyć udoskonalenie modelu przyczynowo-skutkowego poprzez odseparowanie wejść i wyjść dla poszczególnych działań.

Słowa kluczowe: system pomiaru dokonań, ministerstwo, wymagania systemowe, wymagania pomiarowe.

Introduction

Performance measurement (PM) as a part of performance and strategic management processes is one of the most important topics in the public sector today as it helps to meet stakeholder expectations, comply with legal requirements, enable accountability and transparency, and demonstrate progress in achieving strategic goals. Accountability and control continue to be the main focus of PM in the public sector; however, this is shifting to include learning, change and organizational improvement (Behn, 2003; Goh, 2012). The latter means understanding past achievements and failures, making the relevant adjustments to the organization, and altering its strategy. Nevertheless, PM usage in the public sector has proven to be more efficient when integrated with strategic planning (Greiling, 2006).

In the pursuit of PM solutions, public sector organizations take experiences and adopt practices widely used in the private sector. While organizations from both sectors face similar challenges, certain differences exist (Niven, 2008). First of all, „value" has a different meaning. For public organizations, it is the socio-economic impact it creates, while for-profit organizations aim to create economic value for the shareholders. The other trait is the *diversity of stakeholders* of public sector organizations (Behn, 2003; Niven, 2008; Greiling, 2006; Andersen and Lawrie, 2002). Both distinctive features of the public sector have a significant impact on the design of performance measurement systems (PMS).

Particular interest exists in improving PM and reporting principles in the Estonian public sector, as shown by on-going development work including the „TUJU" project (Ministry of Finance, 2006, 2009, 2010, 2011, 2014; Ministry of Agriculture, 2013). In regard to the project, the primary goal is to provide more explicit linkages between the long-term national strategic areas and the actual actions defined in strategic documents. Well-defined linkages presumably should have a positive impact on the budgeting process in the Estonian public sector. Among the desired outcomes of the project are the development of guidelines for setting PM levels, goals and indicators, and guidelines for assessing the impact of strategy implementation.

The goal of this study is to assess the quality of PMS in the Estonian Ministry of Agriculture by analyzing whether it meets certain requirements.

The requirements applicable to PMS could be split into two categories: system requirements and measure requirements. Existing research particularly focuses on system requirements, such as balance, the cause-effect model, links to strategy, and multidimensionality. Measure requirements, in turn, define a number of characteristics that individual indicators should satisfy and a number of attributes that should constitute the definition of each indicator. Measure requirements need further research in further studies.

The study is organized as follows. First, a theoretical base is built. It starts with the definition of the key terms, and a determination and study of the PMS requirements. Second, the research methodology is discussed, and matters such as research materials and research method are addressed. The content analysis of the PMS under investigation is formulated and described. Finally, the results of the analysis are presented and

discussed, conclusions are drawn and improvement recommendations are given. The following part of the research starts by describing the design of the PMS at the Ministry of Agriculture in order to identify the objects of the analysis. It is followed by an analysis and discussion of the results obtained.

1. Components of PMS

To understand how successfully the strategy of the organization is being executed, it is important to evaluate the results; in other words, to measure performance (Frigo, 2002). This task is accomplished by making use of a PMS. In this work, the authors are following the definition given by Neely *et al*. (2005, p. 1229): A PMS can be defined as the set of metrics used to quantify both the efficiency and effectiveness of actions.

The metrics referred to in the definition are also called *performance measures* or *performance indicators*. These two terms are used interchangeably in this study. In addition, the actions mentioned in the definition – the achievement of an objective or any other equivalent entity being measured with the help of a measure or an indicator – are referred to in this work as *measurable*. Therefore, the performance management system is a collection of measures and measurables.

The design of a PMS is one of the fundamental processes of establishing PM in organizations (Paranjape *et al*., 2006). The key challenge that the designer of the system will face is the selection, definition and formulation of measures and measurables (Poister, 2003, pp. 26–27). On the one hand, system requirements applicable to measurables must be considered in order to ensure the appropriateness of the system (Tangen, 2005b). On the other hand, individual indicators must meet a number of measure requirements, such as being relevant, informative, and objective (Neely *et al*., 1997; Tangen, 2005a). The topic of measure requirements is omitted in this work, as the study focuses on system requirements alone.

A variety of methods, models and frameworks exist and can be used by organizations to develop a PMS (Taticchi *et al*., 2010). The principles used as the basis of the design of contemporary PM frameworks were formulated with the rise of the Information Age, when value generation had shifted *from labor to knowledge and hi-tech*, and asset balance had shifted *from tangible to intangible* (Neely *et al*., 2003; Niven, 2008, pp. 3–4). The following are the key principles of „good" PMS.

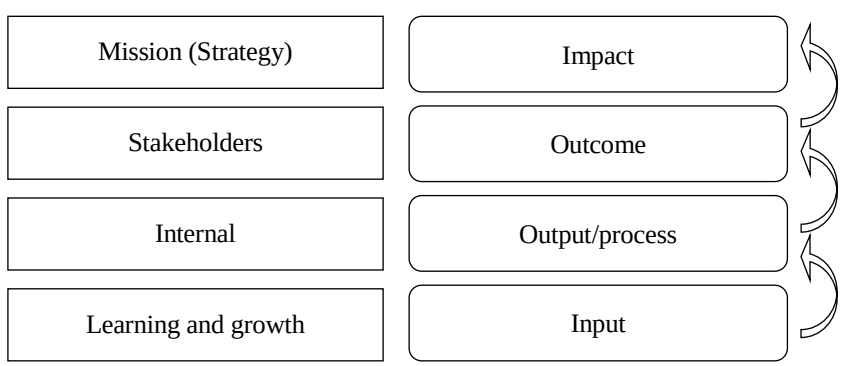
1. Be balanced: different types of measurables must be considered, and traditional financial and internal measures (Niven, 2008, pp. 6–7), and *non-financial* and *external* measures, should be present. Non-financial measures, which are used for measurable entities such as customer satisfaction, ensure sustainable long-term success (Kaplan and Norton, 1992).
2. Encapsulate a cause-effect model: The measured entities must be connected to each other with the help of cause-effect links in order to demonstrate how the organization generates value from intangible assets (Kaplan and Norton, 2004, pp. 9–14). The organizational actions take tangible and intangible resources as inputs, and generate products and services as outputs of the actions. The outputs of

the actions target certain stakeholder groups in order to satisfy their needs and create value; that is, generate outcomes. The outcomes of the organization's activities ultimately contribute to the achievement of strategic goals, the implementation of strategy, the execution of the mission, and the realization of the vision.

3. Be linked to the strategy: This principle is important to ensure the *relevance* of the performance areas being measured. Further, it enables strategic control, which means testing the strategy and verifying whether the assumptions regarding the strategy work in the real world. Moreover, when linked to the strategy, representing the logic of the strategic choices, the performance measurement system can be used to formulate, communicate, and explain the strategy of an organization (Kaplan and Norton, 1992; Neely *et al*., 2007; Lawrie *et al*., 2003).
4. Be multidimensional: The requirement ensures that the performance measurement system covers all the relevant areas of performance (Neely *et al*., 2007). The Balanced Scorecard, undoubtedly the leading performance measurement framework today, has the ability over other systems to present the different dimensions of the performance (Salem *et al*., 2012). The classical framework used in the private sector defines four dimensions or perspectives: Financial, Customer, Internal, and Learning and Growth (Kaplan and Norton, 1992; 2004, pp. 36–52). Due to the fact that the public sector treats value differently, and different groups of stakeholders must be taken into account, it significantly affects the design of the PMS in general and the selection of scorecard perspectives valid for a public organization in particular. Therefore, Financial and Customer perspectives are replaced with Mission and Stakeholder perspectives (Kaplan and Norton, 2001; Niven, 2008, pp. 31–33, 140–142; Jones, 2011). The latter addresses the needs of clients, citizens, the political body, taxpayers, and partners.

Using the sample design of the multi-dimensionality model suitable for public sector organizations (see Figure 1), it is shown below how the design achieves the fulfillment of all the key system requirements.

Figure 1. Multi-dimensionality and the cause-effect model and linkage to strategy



Source: drawing by the authors.

The short-term productivity and financial efficiency objectives and measures, representing taxpayers' interests and included in the *Stakeholder* perspective, together with non-financial objectives and measures of the other perspectives, balance each other out. The external measures are present in the *Mission* and *Stakeholder* perspective, while the *Internal* and *Learning and Growth* perspectives represent the internal environment of the organization. The *Stakeholder* perspective contains the outcomes generated by the organization while implementing its business strategy or carrying out the mission. The *Internal* and *Learning and Growth* perspectives contain the drivers – the activities and resources that are critical for achieving the desired outcomes (Kaplan and Norton, 2000, p. 76; Cobbold and Lawrie, 2002). Therefore, the cause-effect model of inputs, outputs, and outcomes fits into the Balanced Scorecard (Niven, 2008, p. 212). Moreover, the upper *Mission* perspective and objectives-measures included in that perspective ensure the linkage to the organization's strategy. Figure 1 illustrates how the perspectives of the scorecard embed the linkage to strategy (mission) and the cause-effect model.

To conclude, the analysis of a PMS and the assessment of the extent to which it meets the system requirements can be accomplished by evaluation, the performance perspective or dimensions of which are present in the system being analyzed. The measurables and the structure of the system are studied in order to achieve this goal of the study.

2. Design of the empirical study

This section describes the research process, materials, methodology and methods used to analyze the PMS at the Ministry of Agriculture, and assess its quality.

The authors use the archival research strategy (Saunders *et al*., 2009) in order to uncover the origins of the design of the current PMS and to describe the current state of affairs regarding PM in the public sector in Estonia. The secondary data, the documentation publicly available from the web portals of the Ministry of Finance and the Ministry of Agriculture of Estonia, is the main source of information. The documentation provides sufficient information required to explore the current situation regarding the topic of PM in the country, describe the design of the system and identify the elements – measurables and indicators – of the PMS of the ministry. The following documents were studied as part of the archival research:

1. *Strategic Planning Handbook* (Ministry of Finance 2006): The document provides guidelines for the creation of strategic plans in Estonian public organizations. It describes the types of strategic documents of a public organization, their content and development processes.

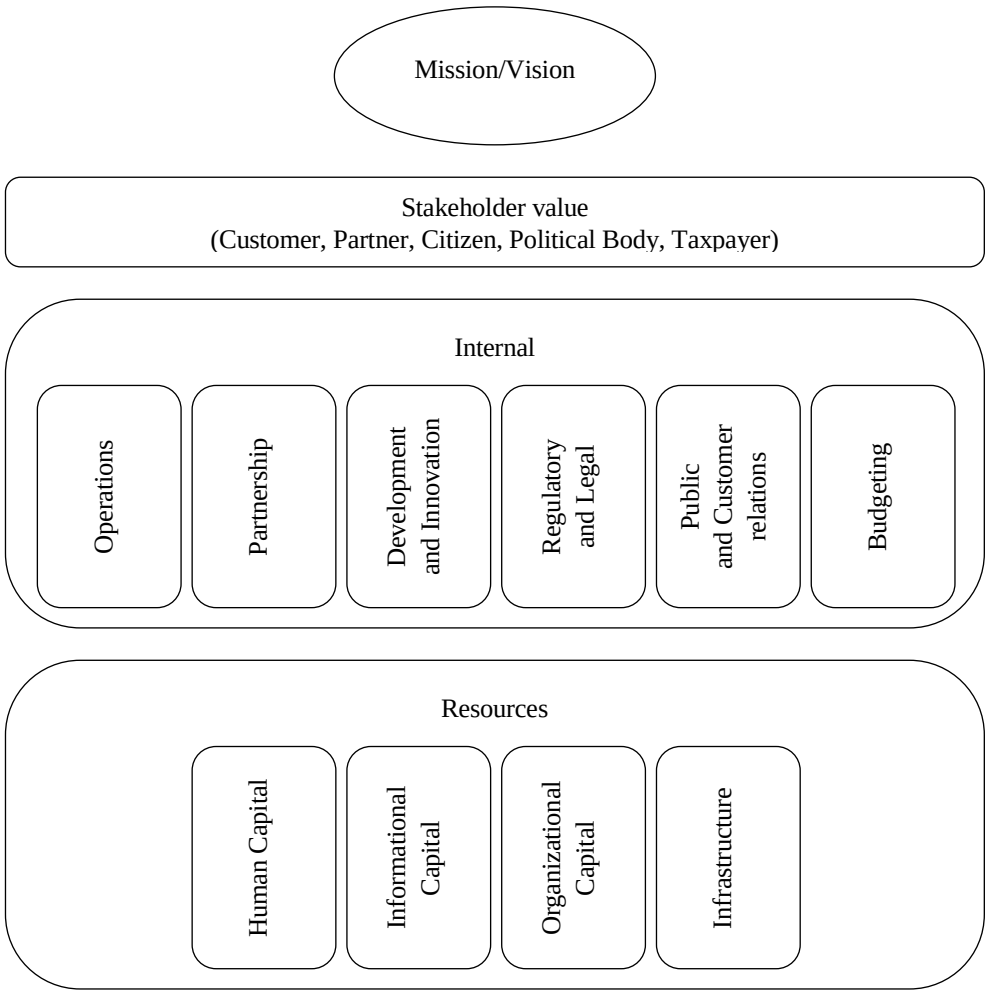
2. *Analysis of State Strategic Planning and Management* (Ministry of Finance 2009): The document presents the results of the analysis of the strategic planning and management in the Estonian public sector. It also draws conclusions regarding the state of the strategic planning and management system and gives improvement recommendations.
3. *Overview of the Developments of the Strategic Management System* (Ministry of Finance 2010): The document describes the current state of affairs regarding planning, budgeting, reporting, control and performance evaluation in the Estonian public sector, discusses the problems in those areas, and defines the future development directions.
4. *Performance Management Levels and Methodological Principles of their Definition* (Ministry of Finance 2011): The document defines the levels of performance management in the Estonian public sector and relationships among them. The list of levels includes the strategic area, outcomes area, program, activities and operations.
5. *Strategic Management Data Objects* (Ministry of Finance 2014): The document defines the objects and concepts, such as goals and measures, of strategic management in the Estonian public sector.

Next, the textual data, which is extracted from *the Strategic Plan 2014–2017 of the Ministry of Agriculture* (Ministry of Agriculture 2013), is used in order to perform the content analysis and reveal the characteristics of the PMS. In addition to that, the data representing the organizational development plan of the ministry, and not included in the strategic plan, is extracted from the *PlanPro* strategic planning-performance measurement information system. In summary, the analyzed data includes goals, sub-goals and actions belonging to the strategic plan of the ministry, and the indicators used to measure the performance and achievement of these goals, sub-goals and actions.

The content analysis is used to carry out the study of the current ministry PMS. The content analysis can be executed using a qualitative approach, a quantitative approach or a combination of the qualitative and quantitative approaches. Although the quantitative content analysis is used more often than other types (Neuendorf, 2002, pp. 10, 14–17; Berg, 2001, pp. 241–242), this study also employs *quantitative* techniques. The research method consists of the following steps: (1) definition of coding categories; (2) selection of units of coding; (3) execution of the content analysis, i.e. coding of the data; (4) presentation of the results (GAO, 1996).

To answer the research question and assess the quality of the PMS at the Estonian Ministry of Agriculture, it is necessary to define its perspectives. The defined perspectives will be used to categorize the measurables. We use the model shown in Figure 2 as a basis for defining the performance perspectives and developing the coding categories.

Figure 2. Categories for the content analysis of system requirements



Source: drawing by the authors.

The following coding instructions are defined for the categories:

1. ***Mission/Vision***: the measurable belongs to the category if it is derived directly from the mission and vision of the Ministry of Agriculture and represents the socio-economic impact the organization is striving to create. Taking into account the framework underlying the PMS being analyzed, there is a high degree of probability that the strategic goals will belong to this category.
2. ***Stakeholder value***: the measurable belongs to this category if it represents the outcome or impact that the organization is striving to achieve. For instance, „Safe food". Considering the design of the PMS, the sub-goals will belong to this category.

3. ***Internal***: the category represents internal processes of the organization, and is broken down into six sub-categories. If a measurable can be labeled using several sub-categories simultaneously, then the parent category *Internal* is used with the keyword „Mixed".
   A. *Public Relations*: the measurable belongs to this category if it mentions any external communication between the organization and its stakeholders. For instance, „Extend the formalization of communication".
   B. *Operations*: the measurable belongs to this category if it represents an activity providing particular services that belong to the area of responsibility of the organization, or the implementation of planned activities (implementation activity is mentioned alone, without planning). For instance, „The inspection of farm animal housing".
   C. *Partnership*: the measurable belongs to this category if the action represented by the measurable mentions collaboration with a third party organization, including participation in joint projects, outsourcing services, supporting other agencies, *etc*. For instance, „Participation in the ERA-NET C-IPM research network".
   D. *Regulatory and Legal*: the measurable belongs to this category if the activity referred to in the measurable is carried out in order to comply with legal requirements, or any obligations originating from a directive or regulation. This category also includes measurables representing a lawmaking process or any other legal activities. In addition, measurables that refer to employment matters, workplace safety, health, etc. belong to this category. For instance, „The Improvement of the Surveillance System of the Governing Area in Order to Comply with EU Regulation 882/2004".
   E. *Development and Innovation*: the measurable belongs to this category if it represents a planning activity aimed at improving the governing area (including mentioning the implementation of planned activities), refers to product or services development or improvement, or refers to the improvement of internal processes. For instance, „The Design and Implementation of the Organic Agriculture Development Plan 2014–2020".
   F. *Budgeting and Reporting*: the measurable belongs to this category if it represents finance-related activity, such as budgeting, reporting, etc. For instance, „Effective budget preparation processes".
4. ***Resources***: the category consists of sub-categories representing tangible and intangible resources of the organization. If a measurable can be labeled using several sub-categories simultaneously, then the parent category *Resources* is used with the keyword „Mixed".
   A. *Human Capital*: the measurable belongs to this category if it refers to improving human capital capabilities, such as training and recruiting, or the creation of additional job positions and departments. For instance, „Coordination of staff training".
   B. *Information Capital*: the measurable belongs to this category if it mentions development, improvement or usage of an information system. For instance, „The development of an information system for monitoring plant healthiness".

C. *Organizational Capital*: the measurable belongs to this category if it contains a reference to leadership development, team-work improvement, communication of values, mission, etc. For instance, „The regular and systematic communication of the development plans to the civil servants".
D. *Infrastructure*: the measurable belongs to this category if it is about improving infrastructure, investing in new equipment, and so on. For instance, „Upgrading the laboratory equipment".

5. ***Undefined***: the measurable belongs to this category if it is unable to classify the measurable in terms of one of the above categories. For instance, the measurable may be too generic, „Stabilization of the fishery market".

The units of analysis are the measurables of the PMS. Each measurable is analyzed and the category to which the measurable belongs is determined. Therefore, via definition of the categories and units, the foundation for the further coding of the source data is established. The results of the coding are presented and discussed in the next section.

3. Analysis of the PMS at the Ministry of Agriculture

A decade ago, the topics related to improving the effectiveness and efficiency of budgeting started to attract the attention of the Estonian government. The ultimate goal of implementing the PMS in public institutions was to improve the performance of the government sector as a whole. The design of the PMS presumed the definition of performance indicators connected to organizational goals to enable the reporting, evaluation and external communication of the organizational performance. Another task that the government intended to solve with the help of a PMS was improving decision-making by providing relevant and appropriate information regarding performance. Furthermore, the improved accountability and transparency after the implementation of the PMS had to facilitate collaboration with the public.

PM had to become part of the *plan-budget-control cycle* in all Estonian government institutions, which means that the strategic plans of the institutions represented objects of measurement. The government Act *The Types of Strategic Plans and the Procedures of Creation, Correction, Realization, Evaluation and Reporting* was approved by the government on 13 December 2005; it defines the structure of the strategic planning model, which includes the *strategic goals* of the organization, *actions* required to achieve the goals, and performance *indicators*. Following the definition provided by the developers of the model, the following objects of the strategic plan can be distinguished (Ministry of Finance, 2006, 2010):

1. *Strategic goals* represent the desired socio-economic impact which the organization is striving to achieve. In other words, it is a high level objective of the organization which is derived from the mission of the organization, belongs to a field of

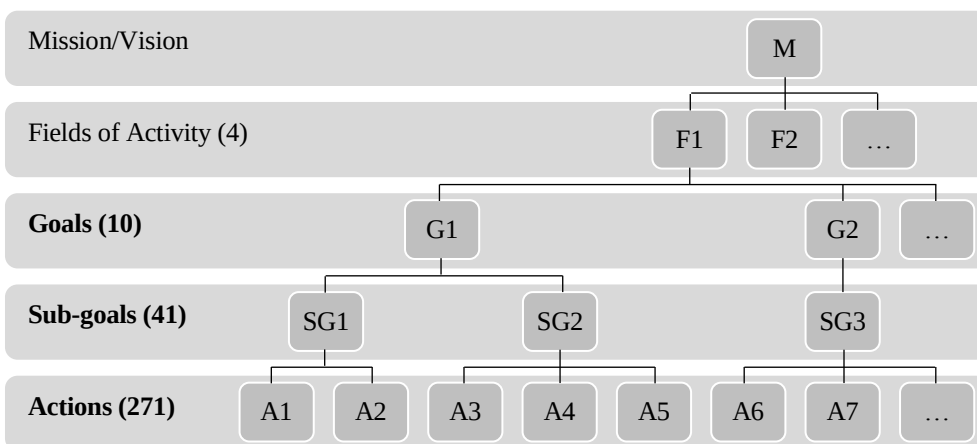
activity within an area governed by the organization, and is based on the analysis of the current situation. Each strategic goal must be measurable, and should have one or more performance *indicators* assigned to it. The guidelines recommend the definition of three different types of goals to ensure the balance of the system when considering the different key *stakeholder groups*, *citizens*, *taxpayers* and *clients*.

A. *Effectiveness* goals represent the extent to which the desired socio-economic impact and targeting of all citizens of the country has been achieved. *Effect* indicators are used to measure the achievement of goals.
B. *Efficiency* goals represent the cost-efficiency of the organization and are of interest to taxpayers. *Outcome* indicators are used together with efficiency goals.
C. *Quality* goals represent the level of quality of the provided services and produced products. This type includes client-oriented goals. *Outcome* indicators are used to measure quality goals.

2. Measures or *sub-goals*[1] are the collection of actions that directly or indirectly contribute to the achievement of the strategic goal for which they are specified. There is no obligation to define indicators for the sub-goals, although cases exist.
3. *Actions* are the actual single actions. Each action should have an *immediate result* definition, *executor*, *responsible agency*, and *donor*. The immediate result represents the output of the action.

In the diagram in Figure 3, the inter-object relationships which exist in the strategic plan are illustrated.

Figure 3. The Objects of the Performance Measurement System



Source: adapted from the Ministry of Finance (2006, p. 22).

[1] Here „measure" means a collection of actions, arrangements to be undertaken. In documentation and in real-life, the concept is also referred to as „sub-goal" or „action set", although the term „measures" is used more often. In this paper we use the term „sub-goal" in order to avoid confusion.

Following the terms defined earlier, the elements of the strategic planning system, that is, strategic goals, sub-goals, and actions, represent measurables. The indicators assigned to the objects are measures. Hence, in order to evaluate the PMS and the fulfillment of the system requirements, the content analysis should be applied to goals, sub-goals and actions. The example of 20 randomly selected coding results is provided in Appendix 1 in order to give the reader a general idea of how the coding is achieved. Table 1 provides an overall summary of the coding of the objects comprising the PMS of the ministry.

Table 1. Coding of the measurables

Category	Number of Occurrences	Percentage
Mission	**7**	**2**
Stakeholder value	**37**	**10**
Internal	**254**	**69**
Budgeting	7	2
Public Relations	5	1
Regulatory and Legal	29	8
Partnership	50	14
Development	36	10
Operations	113	31
Internal (mixed)	14	4
Resources	**54**	**15**
Human Capital	17	5
Information Capital	20	5
Organizational Capital	7	2
Infrastructure	6	2
Resources (mixed)	4	1
Undefined	**16**	**4**

Source: compiled by authors.

Based on the results present in Table 1, the following statements can be made:

1. Measurables for all the defined performance perspectives are present. Although the measurables are not distributed homogeneously among the categories of coding, all the defined categories are covered.
2. *Internal* measurables in general and *Operations* in particular prevail. In total, the measurables belonging to the *Internal* category account for one third of all measurables.

3. The external environment (i.e. *Mission* and *Stakeholder value* perspectives) receives less attention than the internal environment (i.e. *Internal and Resources perspectives*).
4. Only a few financial measurables are defined from the *Budgeting* perspective.
5. Measurables of different types, i.e. impacts (*Mission* perspective), outcomes (*Stakeholder value* perspective), outputs (*Internal* perspective), inputs (*Resources* perspective), are also present.

Moreover, based on the received results, the conclusion might be drawn that the system fulfills the requirement of multi-dimensionality. All the perspective-categories are present in the system. Although the number of measurables in some categories prevails, the presence of financial and non-financial, and external and internal measurable, allows the system to be considered *balanced*. The predominance of operational process measurables is a consequence of the usage of the system as a planning-control tool. Besides that, the focus on operational excellence is natural in the public sector (Niven, 2008, pp. 170–172).

Considering that the *Mission* perspective represents *impact* measurables, the *Stakeholder value* perspective represents *outcome*s, the *Internal* perspective includes *output*s, and the *Resources* perspective includes *input* measurables, the following relations between objects of measurement and types of measurables can be distinguished (see Table 2).

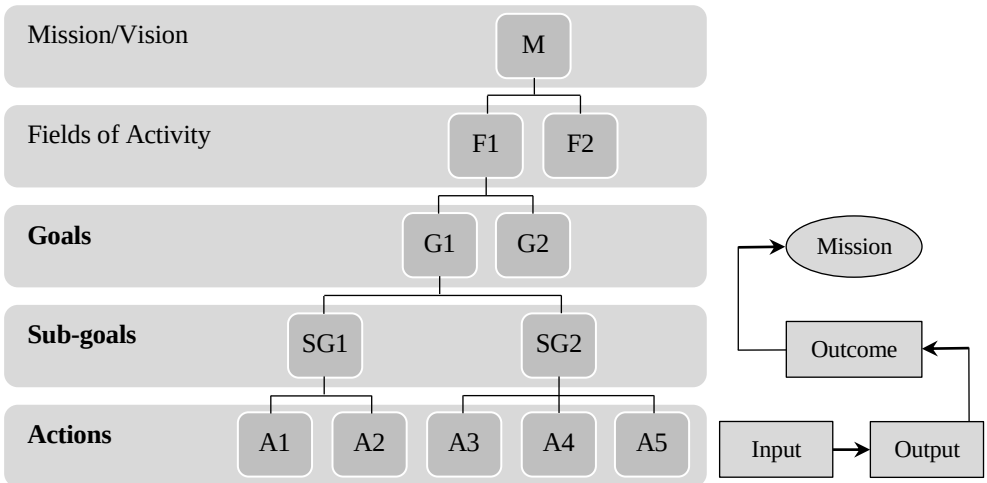
Table 2. Number of occurrences of different measure types

Measure type	Number of occurrences							
	Impact (=Mission)		Outcome		Output		Input	
Goal	7	100%	2	5%	–	–	1	2%
Sub-goal	–	–	34	92%	3	1%	3	6%
Action	–	–	1	3%	251	99%	49	92%
Total	7		37		254		53	

Source: compiled by authors.

As can be seen, all the goals in the strategic plan are classified as *impacts*; the majority of the sub-goals represent *outcome*s; and actions, despite the existence of single exceptions, represent outputs and inputs. Hence, it can be concluded that the system encapsulates a *cause-effect model*. Figure 4 illustrates the relationships between the objects in the strategic planning-performance measurement system and the types of measurables.

Figure 4. Cause-effect model of the PMS*



* Measurables on the left; measure types and cause-effect links between them on the right

Source: drawing by the authors.

Figure 4 combines the diagrams present in Figure 3 and Figure 2. As we can see, the structure of the strategic planning-performance measurement system embeds the cause-effect model of inputs, outputs, and outcomes. Moreover, as long as the strategic goals *per se* represent the mission and the vision of the ministry, the conclusion may be drawn that the system *satisfies the strategy linkage* requirement.

In conclusion, the performance measurement system implemented at the Ministry of Agriculture satisfies the applicable system requirements:

- balance,
- cause-effect model,
- strategy linkage,
- multi-dimensionality.

However, some improvements can be applied to the definitions of measurables:

1) split the measurables that represent several performance perspectives simultaneously. At the moment about 5% of the measurables cannot be accurately categorized and labeled using „Mixed" categories (see Table 1);
2) a review and redefinition of the measurables included in the category „Undefined" should be considered. Currently, about 4% of measurables cannot be assigned to a category (see Table 1);
3) explicitly disjoint input and output, now represented by the actions of the strategic plan (see Table 2), to improve the cause-effect model and the identification of enablers (i.e. resources required to execute organizational processes and actions effectively and efficiently).

Conclusions

This research aimed to analyze the PMS currently used at the Ministry of Agriculture, and assess the extent to which the system meets the requirements applicable to a contemporary PMS. First, a literature review built the theoretical basis for the analysis, and explored the *system requirements* applicable to the design of a PMS. The System requirements should be met in order to ensure the appropriateness of the system while answering the key design question – what should be measured? The following essential design principles represent the requirements applicable at the system level:

1. *Balance*. When followed, the principle ensures that the performance measurement system includes financial and non-financial, internal and external measurables.
2. *Cause-effect model*. The model should be embedded in the system in order to demonstrate how value is generated by the organization.
3. *Linkage to strategy*. The linkage to strategy principle ensures that the right things are measured.
4. *Multi-dimensionality*. This principle makes it possible to consider the different areas of performance.

Second, an analysis of the documentation publicly available from the web portals of the Ministry of Finance and the Ministry of Agriculture helped to gain an understanding of the design of the PMS under investigation, and identify objects of measurement a.k.a. measurables, and the corresponding performance indicators that constitute the system. The investigation showed that measurables are represented by the elements of the strategic planning system, i.e. strategic goals, sub-goals, and actions. One or several indicators may be assigned to the objects of the strategic plan in order to track the achievement of the planned actions. As a result, the basis for further analysis of the system is established – the entities to be analyzed are identified.

Lastly, the quality of the PMS at the Estonian Ministry of Agriculture was assessed. For the purpose of the *content analysis of the system requirements*, the objects of the strategic plan are categorized according to defined performance perspectives. Based on the analysis, we can conclude that although the measurables are not distributed homogeneously among the categories, all the defined categories are covered. Hence, a conclusion might be drawn that the system fulfills the multi-dimensionality requirement. Through the satisfaction of the multi-dimensionality requirement, it is demonstrated that the system also fulfills the other system requirements. The requirement of balance is satisfied as financial and non-financial, external and internal measurables are identified. The cause-effect model requirement is met, as a cause-effect relationships exist between the measured inputs, outputs, and outcomes. The linkage to strategy requirement is satisfied as the top-level strategic goals represent the mission of the organization and through their measurement, the socio-economic impact of the organization's activity is measured. In summary, the Ministry of Agriculture PMS demonstrated a relatively good level of compliance with the requirements applicable to a modern PMS. However, the following recommendations are offered based on the results of the research:

1. Split measurables in such a way that they only represent a single area of performance.
2. Review measurables that cannot be assigned to any of the defined categories.
3. Consider improving the cause-effect model by separating inputs and outputs represented by actions.

Therefore, the study provides answers to the research question and achieves the set goal. Further research could be devoted to evaluating the proposed sample multidimensionality model, the collection of feedback from ministry officials regarding the appropriateness of the model, and whether it is feasible to exclude or include additional dimensions. Another option for further research is the analysis of other potential requirements that the system should meet.

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Appendix 1. Sample of the coding results of measurables

Measurable	Category
4.1.4. Effective internal control system.	Internal
T1.1.2.16. Participation in the development of new food and nutrition recommendations.	Partnership
E.3.4. Organization of promotional activities (competitions, shows, exhibitions)	Public relations
1.2.1. Animals saved from suffering, and citizens informed about animal well-being.	Stakeholder value
P2.1.5.147U. Organization of the land improvement activities.	Operations
4.2.4. Modern and inspiring working environment.	Resources
T1.2.1.27. Inspection of housing of farm animals.	Operations
Publishing of the monograph *The Estonian Rural Life: Agriculture Senior Executives 1918–2018*	Undefined
P2.2.1.159. Realization of the measure 2.3.4 of the Rural Life Development Plan	Operations
P2.1.3.124. Continued implementation of the Single Area Payments	Operations
P2.3.2.184. Development of museum programs, development of new exhibitions, development of education and research activities	Development
P2.1.1.111. Training sessions for consultants in mandatory and recommended topics related to the new advisory program	Human Capital
T1.2.2.35. Development of animal disease control programs	Development
2.3. Ensure the balanced development of agriculture-related areas, and improve life in rural communities	Mission
2.2.2. Well-developed environment friendly farming	Stakeholder value
K3.1.1.203. Support the formation and operation of joint activities	Partnership
T1.3.2.83. Development and launch of a more efficient control of wild oats	Development
P2.3.2.193U. Renovation of museums and other buildings	Infrastructure
P2.1.4.132. Monitoring and analysis of the state of agriculture and manufacturing industry, the support measures, and the agricultural products market; development of suitable policy instruments and improvement of the administration of grants	Internal

Appendix 2. Sample of the coding results of indicators

Measurable	Indicator	Category
1.1.2. Informed consumer	M1.1.2.4. Percentage of customers, who always or often read food labels	Partially suitable
3.1.5. Maximal sustainable yield of fish stocks.	M3.1.5.75. Number of EFF projects to restore fish spawning areas and fish stocks	Suitable
1.2.1. Animals saved from suffering, and citizens informed about animal well-being.	M1.2.1.10. Ratio of the number of identified animal welfare violations to the number of carried out checks	Suitable
3.1.4. Well-used opportunities of the local market	M3.1.4.72. Percentage of the coastal local authorities (fishery areas) who participated in projects	Suitable
2.3.1. Substitutability of diminishing agricultural jobs	M2.3.1.70. The number of agricultural households with diversified activities	Suitable