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Preliminary report on a multi-criteria decision analysis approach to participatory municipal strategizing

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ABSTRACT

Public strategies as well as strategic planning can play an important role in governing and managing a municipality, partly by supporting decisions and action-alignment at all levels of the organization. In this study the focus lies on developing the foundation of a municipal growth strategy, as well as the process for designing it, in co-creation with the municipality of Kramfors. The municipality's growth strategy is dependent upon a set of objectives which in this study are indirectly grounded in an explicit value basis representing three different levels, namely the municipal, the regional, and the global level. The design process includes deriving strategic themes, eliciting objectives along with indicators and weights. The strategic themes are extracted from relevant parts of the value basis, and form the backdrop of the objectives elicitation. The weight elicitation is performed by letting the various parts of the value basis play the role of stakeholders. The latter two are used to construct a value model, based on multi-criteria decision analysis, for subsequent valuations and comparisons of alternative strategies and action plans. As soon as the objectives and the value model are ready, they will be sent to a consultancy firm who will produce the final written-up strategy document.

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1 Introduction

Good public strategies can pay off by growing intangible assets such as capabilities or confident institutions, and shrinking problems like pollution and social exclusion, while staking out the path towards the realization of the potential of a public institution Mulgan (2009). Strategic planning is meant to support managers' decision-making in times of issues or challenges of considerable magnitude Bryson (2018). Since strategy itself is about actions or manoeuvres at a general level (Eden and Ackermann, 2013), strategizing must be preceded by, or include, a clarification of the organizations mission and goals. According to Fjertorp et al. (2012), it is the way resources are utilized, i.e., the methods and actions, that comprises the strategy. Mulgan (2009) provides a comprehensive definition: "Public strategy is the systematic use of public resources and powers, by public agencies, to achieve public goals."

The set of public goals ought to be influenced by the values carried by the actors (i.e., citizens, business, institutions, etc.) within the public entity. Those values can collectively be referred to as the value basis of the public entity. A value basis is essentially a set of desirable states relative to a group of individuals (or actors), based on the notion of subject-neutral values (see, e.g., Oddie (2015)). Translating the value basis of a municipality into a practical and meaningful municipal strategy in a way that is transparent to all involved stakeholders, such as citizens and policy makers, is a complex venture.

The goal of the project is to create a framework for eliciting strategic objectives, along with indicators, and for generating and evaluating municipal strategies based on a participatory approach and multi-criteria decision analysis. The decision model's strategic objectives and criteria are derived from a value basis, and the alternatives are made up of portfolios consisting of strategy components—such a portfolio will subsequently serve as the foundation for the actual strategy (i.e., the high level actions or manoeuvres).

The city of Kramfors will be used as a case study where the details of the framework will be developed in co-creation and subsequently evaluated. The municipality of Kramfors with a population of about 18.000 is located in the Swedish region of Västernorrland. In Kramfors' case, the value basis has three different levels, the municipal level, the regional level, and the global level. On the municipal level the value basis consists of (1) the outcome of a citizen survey with relatively open questions, (2) the vision of the municipality, and (3) an external monitoring report from Kairos Future. On the regional level there is the (4) the regional strategy, and on the global level there is (5) Agenda 2030. There is not part of the value basis corresponding to the national level.

1.1 Research problem

The municipality's vision for year 2031 includes three major pillars: togetherness, courage, and vitality. One step towards realizing that vision involves the development of a number of strategies. To make Kramfors more attractive, for citizens as well as businesses, the municipality will develop and decide on a growth strategy by early 2022. The strategy should take municipal, regional, as well as global aspects into account. The growth strategy is meant to achieve objectives that are in line with the municipality's value basis and have a clear connection to a set of specific documents as well as the municipality's brand *Mitt i Höga Kusten* [At the center of the High Coast].

The idea is to aim for objectives at the municipal, the regional, and global level while accounting for the municipal and local conditions. In particular, the strategy development should consider the value statements of citizens and local businesses. A foundation for a true strategy will be developed within the bounds of this study. That foundation will later be given to a consultancy firm who will produce the final written-up strategy.

1.2 Research questions

The framework includes (1) survey methods for multi-agent elicitation of objectives and weights, as well as importance and uncertainty levels of those, and (2) techniques for aggregating the elicited data in preparation for use in weight elicitation processes. The study aims to provide answers to the following research questions: (1) What is a reasonable method for eliciting strategic objectives for a public entity from a broad value basis, given a particular vision? (2) How can vague input from multiple agents, possibly inconsistent or disjoint, be aggregated most reasonably and pragmatically in the aforementioned context? (3) Given a large number of stakeholders with varying backgrounds and values, what would be a reasonable and informative aggregate model of their input for future use in decisions on public strategies and action plans?

1.3 Concepts

1.3.1 Municipal growth

Municipal growth is a complex phenomenon whose meaning depends on the local conditions (Fjertorp et al., 2012). Common definitions are based on changes in population, income per capita or employment level. However, in many cases municipal growth refers to welfare creation in the broad sense, the overall health of the citizens, as well as the volume of public infrastructure assets. In any case, municipal growth is thought to be unique to the challenges and opportunities imposed by the local conditions. Furthermore, the general objective of municipal growth is increased attractiveness as a place to live and work, in addition to a continuous alignment of municipal services and operations to the current situation.

There are three fundamental components of municipal growth (Fjertorp et al., 2012). First, there needs to be internal consistency and alignment. The vision should be comprehensible such that it can form a basis for the operations of the municipality as well as of those of external actors. It should be able to act within the municipality, and relations and competencies must fit the business environment. Second, external actors must be engaged in the growth process—their contribution is fundamental to a continuous development. To create that engagement through the vision, it should be reasonable as well as trustworthy, and must be communicated. Using the vision to create engagement Lastly, the municipality needs to stay proactive in order to maintain a certain level of freedom, as opposed to constantly reacting to various stimuli.

A common picture of what is needed for growth is key. Therefore, the number of growth factors should be kept relatively small, and they need to be congruent (Fjertorp et al., 2012). Also, they need to be thought through and applicable to the organization as it is usually hard to make big changes quickly.

1.3.2 Types of objectives

We distinguish four types of objectives. *Strategic objectives* are long term objectives expected to be influenced by any decision made within the organization over the lifetime of those objectives (Keeney, 2007). *Fundamental objectives* are the objectives affected by any alternative in a given decision context, and that in turn affect the strategic objectives (Keeney, 1996). *Means-ends objectives* influence the extent to which one or several fundamental objectives can be achieved (Keeney, 1996). *Process objectives* concerns the qualities of the decision-making process (Keeney, 2007), e.g., that a decision should be based on a particular set of data, involve certain stakeholder groups, etc. Fundamental objectives and means-ends objectives can be specified based on three types of relations on a set of objectives and a set of criteria (c.f., (Manheim and Hall, 1968)). A fundamental objective is either specified by at least two other fundamental objectives or connected to a criteria. A means-ends objective is related to at least one fundamental objective or means-ends objective.

1.3.3 Multiple-criteria decision analysis

Multi-criteria decision analysis, or MCDA, are often used in situations where a decision maker is deciding on the behalf of others, such as in decisions on public policy (Dyer, 2016). It is therefore reasonable to base decisions on a logically consistent framework rather than in an ad hoc fashion. That decisions in general may be irrational, in the economic sense of the word, does not render normative rational decision theories irrelevant or inapplicable.

In this study we apply multi-attribute value theory or MAVT, which deals with preferences under certainty (Dyer, 2016). The value $V(a_k)$ of an alternative a_k is the weighted sum of the values of a_k under each of the criteria. Let w_i be the weight of the i th criterion and let $v_i(a_k)$ be the value of a_k under the i th criterion. Then the total value of a_k is given by

$$V(a_k) = \sum_{i=1}^n w_i v_i(a_k). \quad (1)$$

1.3.4 Surrogate numbers

Many authors have noted inherent difficulties with the elicitation of criteria weights (see, e.g., (Barron and Barrett, 1996; Danielson and Ekenberg, 2015)). In addition to being abstruse, even for experts, and thus unlikely to result in an accurate representation of the true weights in the elicitor’s mind, weights elicited as exact real numbers may present a false sense of precision Danielson and Ekenberg (2017). A less complicated and more realistic alternative, which thereby requires less mental effort from the respondent, involves eliciting ordinal criteria weights (Riabacke et al., 2009). Approximate weights were obtained by mapping the rank positions of a strict ordering to real numbers, using a reasonable and meaningful strictly monotonic function (Stillwell et al., 1981). However, the expressive power of a strictly ordinal scale is severely limited. A solution proposed by Danielson and Ekenberg (2015) takes a particular notion of differences into account, namely that of cardinal steps, to which stipulated meanings such as “equally important,” and “slightly more important,” are assigned.

Cardinal steps correspond to ordinal rank positions. If two criteria have zero cardinal steps inbetween, then they share the same ordinal rank position. If two criteria are one

cardinal step apart, then they are at adjacent ordinal rank positions. If two criteria differ by two cardinal steps, then there is either another ranked criteria or an empty ordinal rank position inbetween them, etc. Let a , b , and c be criteria such that if a decision maker could use only ordinal ranking she would rank them as $a \succ b \succ c$, with \succ being the relation “more important than.” By introducing cardinal steps, indicated by an index attached to the relation symbol, we can write the previous rank ordering as $a \succ_i b \succ_j c$. The numbers i and j would correspond to the strength of differences as in (Danielson and Ekenberg, 2015).

\succ_0 : ‘equally important’

\succ_1 : ‘slightly more important’

\succ_2 : ‘more important’

\succ_3 : ‘much more important’

Applying a cardinal importance relation provides the decision maker with considerably more flexibility when it comes to eliciting weights compared to ordinal weight elicitation.

Multiple methods have been proposed for mapping ordinal rank positions to real numbered weights. Their respective fittingness depend partly on the assumptions made about how a decision maker would assign weights analogous to scoring—*point allocation* or *direct rating*. The same methods can be used for cardinal rankings by extending them to account for cardinal rank positions instead of strict ordinal rank positions. The formula

$$w_i^{\text{CSR}} = \frac{1/p(i) + \frac{Q+1-p(i)}{Q}}{\sum_{j=1}^N \left(1/p(j) + \frac{Q+1-p(j)}{Q}\right)} \quad (2)$$

where N is the number of criteria, $p(i)$ is the cardinal rank position of criteria i and $Q = \max p(i)$ is the cardinal rank position of the least important criteria, represents one such method. It was found to be the most robust of many (Danielson and Ekenberg, 2015), and will be the one used in this study.

2 Preliminaries

2.1 Stakeholders

Three stakeholder groups are considered for producing the value model: (1) the politicians of the municipality, (2) the citizens, and (3) local businesses. The politicians of the municipality will eventually be able to provide input during a comment period, and finally by voting for or against adopting the proposed strategy. To understand what is important for living a good life, and for a thriving business community, a number of citizens and local business representatives were surveyed.

Yet another type of stakeholder group are the ones expected to use the value model when developing and choosing between alternative strategies or action plans at an operational or tactical level in the organization.

2.2 Development areas

Eight development areas were provided along with the order of the growth strategy (Kommunstyrelsen, Kramfors kommun). They were:

- Population growth
- Level of education
- Infrastructure
- Employment
- Competence supply
- Attractive housing environments
- Enhanced outdoor and cultural life
- Social integration

The final strategy should point out the direction and the priorities of the municipality with regard to those areas. To do that we started by mapping the relationships between the areas.

2.3 Value propositions and objectives

A value basis is essentially a set of desirable states relative to a group of individuals, based on the notion of subject-neutral values (see, e.g., (Oddie, 2015)). The value basis has three different levels. At the *municipal level* there are the results of a citizens and business dialogue in the form of a survey, as well as the recommendations in a knowledge platform developed in collaboration with Kairos Future, a consultancy firm. The *regional level* is represented by the regional development strategy of Västernorrland. Agenda 2030 constitutes the *global level*.

2.3.1 Kramfors' Vision 2031

The vision of the municipality should inspire and guide its future direction (Kommunfullmäktige, Kramfors kommun). It is an illustration of what place to live, work and visit Kramfors municipality should be. It is based around *togetherness*, *courage*, and *vitality* (Kramfors kommun, 2021). *Togetherness* is about openness, tolerance and trust between people. It also refers to the connection between cities, towns, rural areas, and the archipelago. *Courage* goes together with diversity and creativity. It involves curiosity, high ambitions, identity, and learning. Kramfors strengthens the region by being a go-ahead municipality. *Vitality* is about harnessing ideas and participation. Entrepreneurship together with a variety of jobs and a green environment makes the municipality attractive to citizens, visitors, and businesses. People in Kramfors are healthy, kind and encouraging.

A number of goals, some concrete (e.g., “The emission of greenhouse gases should be 20 % lower than in 2013”), and some vague (e.g., “All adolescents believe in the future”), should be instrumentalized. Doing that, however, is a process in itself—forming a set of consistent strategic objectives is an important step toward transforming the vision into actions.

2.3.2 Goal and resource plan

In Kramfors' goal and resource plan for 2022-2023 (Kommunfullmäktige, Kramfors kommun) it is clearly stated that the activities of the various units should be clearly connected to the municipality's vision and the municipality's overarching objectives.

Three perspectives, also referred to as strategic areas, are part of the municipality's goal-steering: (1) citizens, (2) employees of the municipality, and (3) finances. It is the first perspective we focus on in this study. Its overarching objective is To have sound operations with effective processes (Kommunfullmäktige, Kramfors kommun).

2.3.3 Citizen and business survey

The survey sent out to the citizens and business representatives started with one overarching question to each group. The citizens were asked "What do you consider the most important factors for living in Kramfors municipality?" Analogously, the business representatives were asked "In your opinion, what are the most important factors for a viable business community in Kramfors municipality" Each respondent could provide up to seven important factors.

The rest of the survey was the same for both citizens and business representatives. A second question asked the respondents to rate the important factors they had elicited themselves: "What is your perception of how well Kramfors municipality today lives up to what you have indicated as important factors?" The answer was expressed on a 5-degree nominal scale of (—, —, 0, +, ++). An assignment of '—' to an important factor would imply it was considered to be less fulfilled than another important factor assigned '—', one assigned '—' to be less fulfilled than one assigned '0', and so on. However, we cannot assume two important factors, both assigned, e.g., '+', to be equally fulfilled.

Once all of the factors were ordered based on importance and rated based on the degree of fulfillment, the respondent was asked three follow-up questions. The first one concerned the factor ranked as the most important: "You mentioned X as most important for a viable business community in Kramfors municipality. Can you elaborate on why you think that so we understand even better?". The second was about the most important factor of those who received a (fulfillment) rate of '—' or '—': "You mentioned Y as something that Kramfors municipality today does not really live up to, how could this be done better in your opinion?". The third was giving the respondent the opportunity to provide additional comments: "Is there anything else you would like to add that was not previously included in the survey?".

2.3.4 Knowledge platform

The knowledge platform is a result of Kairos Future's (a consultancy firm) analysis of Kramfors current situation (Kairos Future, 2020). It includes strategic recommendations for future priorities from five perspectives: (1) the external perspective, (2) the close perspective, (3) the job market perspective, (4) the citizens perspective, and (5) the visitor perspective. The knowledge platform was developed in collaboration with representatives from the municipality. The objectives of developing the platform included: (1) compiling a complete picture of the municipality with respect to possible long-term threats, opportunities, and challenges, and (2) provide strategic recommendations for shaping the municipality's future.

2.3.5 Regional development strategy

Västernorrland's regional development strategy (RUS) for the years 2020–2030, was a collaborative effort of the municipalities in the region, universities and research institutions, relevant governmental agencies, the region's business community, and others (Region Västernorrland, 2019). It points out strategic objectives and priorities for sustainable growth and development, common to the region's actors, and is based around three themes: (1) the region is strengthened from a national and global perspective, (2) the region as a place where people want to live and visit, and (3) the region as a place for businesses and organizations to grow. For each of these it provides strategic recommendations.

2.3.6 Agenda 2030

Agenda 2030 is meant to stimulate action in five critical areas: (1) people, (2) planet, (3) prosperity, (4) peace, and (5) partnership (United Nation General Assembly, 2015). Agenda 2030 includes 17 sustainable development goals (SDGs). Under each goal there is a number of targets. In addition, United Nation General Assembly (2017) presents 231 SDG indicators. Agenda 2030 was a foundation for the development of RUS (Region Västernorrland, 2019).

3 Methods

3.1 Process

The main process is outlined in Figure 1. Initially the value basis was structured so that the relevant parts could be obtained by a filtering based on the predetermined development areas. The filtered value basis was then analyzed to yield a number of strategic themes. Strategic objectives were elicited for each of the strategic themes, along with meaningful indicators. The indicators were then assigned weights based on a subjective interpretation of the value basis by representatives from the municipality. Based on the indicators and their respective weights, a valuation model for future strategies and actions plan was formed. The strategic objectives, the indicators, and the valuation model formed the basis for the written up strategy document.

In addition, a method for generating alternative strategies and action plans based on morphological analysis should augment the strategy document to support the strategy implementation at various levels in the organization.

3.1.1 Extracting objectives from document sources

The various documents were searched for terms or phrases naming or describing objectives. The findings were highlighted and stored in a list. Each item in the list was subsequently labeled as a strategic, fundamental, means-ends or process objective. Fundamental objectives were related based on specification. Means-ends objectives were linked accordingly. Seemingly conflicting objectives were related as well. The resulting list of objectives and their relations were transformed into a graph model for visual inspection and use in the ensuing elicitation of strategic objectives.

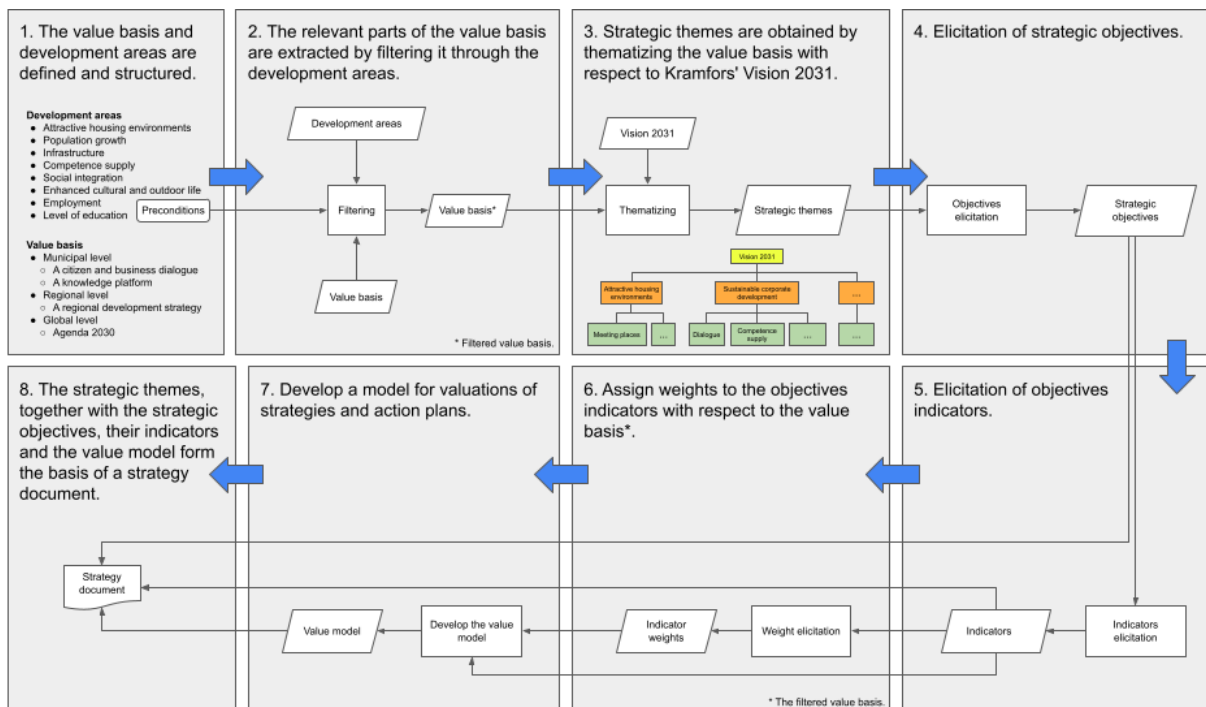


Figure 1: An overview of the process of producing a strategy document containing strategic objectives, indicators, as well as a value model for evaluating future alternative strategies and action plans.

3.1.2 Structuring the survey responses

The results of the citizen and business survey were structured by having representatives from the municipality assign the factors in the responses to various clusters representing strategically important themes representing what was valuable to citizens and businesses.

Let $N = \{1, \dots, n\}$ be the set of individual respondents partitioned into N_B (business representatives) and N_C (citizens). Let A_i be the set of important factors elicited by respondent i , and $\mathcal{A} = \bigcup_{i \in N} A_i$ be the set of all important factors obtained through the survey.

A response R_i of a respondent i is a relational system (A_i, P_i, W_i, L_i) . The relation P_i is read as “is more important than,” and W_i as “is currently better fulfilled than,” and L_i as “has the same fulfillment label as.” In one actual response we find, for example, $aP_ib \wedge bP_ic$, $aW_ib \wedge cW_ib$, and aL_ic , where a stands for “developed infrastructure”, b for “dynamic environments”, and c for “competence supply”. The relation P_i is asymmetric, complete, and transitive. If a is more important than b , the converse cannot be true. Hence, P_i is asymmetric. Furthermore, a respondent must rank all the important factors provided in her response. Consequently, for any two important factors that are not the same, one of them is guaranteed to be more important than the other, and therefore P_i is complete. Lastly, if a is more important than b , and b is more important than c , then a is more important than c , and so P_i is transitive. In the citizen and business survey the instrument does not allow nontransitive input and thus forces the transitivity of P_i , regardless of whether importance relations should be considered transitive in general.

Because the inquiry about the level of fulfillment relies on the interpretation of the labels '++', '+', '0', '-', and '--', we can only assume the relation W_i to be a strict partial order, that is, asymmetric and transitive. It is asymmetric because an important factor cannot be both better and worse fulfilled than another. Let $l_i(a)$ be a mapping, for some respondent i , from the set of fulfillment labels $\{++, +, 0, -, --\}$ to the real numbers, such that $l_i(a) > l_i(b)$ if a 's fulfillment label indicates a better fulfillment than does b 's. Analogously to P_i , we have $l_i(a) > l_i(c)$ if $l_i(a) > l_i(b)$ and $l_i(b) > l_i(c)$. Hence, W_i is also transitive.

Two important factors (a, b) are in L_i iff they have the same fulfillment label. In other words, L_i partitions A_i according to the fulfillment labels assigned to the elements of A_i .

All the important factors elicited by citizens and company representatives were grouped into important areas $B_i \in \mathcal{B}$, a form of clusters, based on the civil servant's interpretation of them, given the particular context. Let $\mathcal{A} = \bigcup A_i$ be the set of all important factors obtained through the survey. The important areas B_i are defined by the relation T on $\mathcal{A} \times \mathcal{B}$ such that if aTB_i for some $a \in \mathcal{A}$ then $a \in B_i$. It follows that $B_i = \{a \in \mathcal{A} \mid aTB_i\}$.

The recommendations in the knowledge platform compiled by Kairos Future were split into individual statements, such as "create a greener, more digital, and electrified infrastructure," and resulted in a list of 17 value statements. The report follows the definition of a value statement provided by Beck (1967): a value statement is "an expressed claim that something is good, bad, right, or wrong (or whatever it may be)." Thereby, a statement such as the above is interpreted as to claim that "a greener, more digital, and electrified infrastructure is good (and thus desirable)."

RUS was divided into statements relevant to the strategy, similarly to what was done with the knowledge platform. That operation resulted in 16 statements.

Each of the SDGs in Agenda 2030 was considered a broad value statement. An alternative would have been to take each of the 169 targets as value statements. The latter would, however, have defeated the purpose of the study by being too demanding on the involved parties and decision makers. A viable compromise could have been to only include a subset of the targets.

3.1.3 Filtering the value basis

Once the value basis was divided into parts equivalent to value statements, each of these parts were mapped to the different development areas based on the civil servants' appraisalment. A value basis part was mapped to a development area only if it was deemed to have an adequate level of significance for that development area. Any part of the value basis not mapped to any development area was removed. The set of remaining value basis parts made up the filtered value basis.

3.1.4 Thematizing the filtered value basis

To obtain strategic themes (Kaplan et al., 2004) from the filtered value basis we followed a thematic analysis approach, as outlined in (Terry et al., 2017)—deductive with respect to the municipality's vision. Because most of the value basis already consisted of relatively clear statements, analogous to codes, grouping the statements into relevant themes and sub-themes was the main focus. Nevertheless, codes had to be explicitly produced to represent the

contents of the survey clusters. The strategic themes should support the municipality in focusing the action to the value propositions derivable from the filtered value basis.

3.1.5 Eliciting strategic objectives and indicators

A set of strategic objectives should be developed for each of the strategic themes. The objectives should be such that measurable indicators could be attached to each of them. The process of eliciting objectives and indicators followed Keeney (1996), except that the objectives in this case naturally will be at the strategic level, and indicators is what Keeney (1996) refers to as attributes.

3.1.6 Eliciting indicator weights

Indicator weights were elicited indirectly by the assignment of weights to the objectives. Preliminary weights were elicited by the municipality’s representatives, based on their interpretation of the value basis.

The procedure is to some extent an adaptation of the weight assignment step in the multi-actor, multi-criteria analysis methodology (MAMCA) approach, presented in Macharis et al. (2009). The main parts of the value basis (i.e., the survey results, the knowledge platform, RUS, and Agenda 2030) are considered sets of actors. In this case the survey results were assigned the greatest actor group weight, followed by the knowledge platform, RUS, and Agenda 2030, in that order. Those weights were mainly dependent on the survey results being the most local to the municipality, and Agenda 2030 being the most remote. The actors within each group were also assigned stakeholder weights depending on their estimated relevance for the growth strategy. In the case of the survey clusters, they were assigned stakeholder weights equal to their aggregated importance levels—the process for obtaining those is described below in Section 3.2. The stakeholder weights were assigned to the actors by representatives of the municipality, and could subsequently be revised by the decision maker.

Each of the actors would then assign points to each of the objectives. Naturally, the artificial actors (i.e., the parts of the filtered value basis) were unable to assign points themselves. Representatives from the municipality took on the role of each actor by interpreting the associated value statement, and assigning the number of points they found reasonable to the different objectives.

3.1.7 Constructing a value model

The construction of a value model rests on the premise that future alternative strategies and action plans can be compared using multi-criteria decision analysis (MCDA), providing a meaningful foundation for a decision or further discussion about the problem. The indicators will take on the roles as weighted criteria. The value model will be implemented in the digital tool Helision (Preference AB, 2021) that allows for several types of value statements, not least imprecise ones. Whether the result of an evaluation alone generally would warrant a particular decision, as if the process was automatic, is questionable; in particular given all the peculiarities of an individual case, as well as the uncertainty regarding to criteria weighting and the subsequent valuations of the alternatives under each of the criteria—this is

important since the initial weight elicitation is made without regard to any actual alternatives. Nevertheless, a value model provides an important opportunity for decision makers throughout the organization to explicitly challenge the assumptions made higher up in the organizational power hierarchy. As such, a value model can function as a tool for organizational learning, as well as for harmonizing the organization’s priorities and capabilities. Thereby calibrating the organization organically to become more effective.

3.2 Aggregating survey responses

In this case, the purpose of the aggregation is to give a picture of the degree of importance that would be reasonable to assign to the various areas of importance, given the survey results. In addition, we want to find a representation of the general view of the extent to which the different areas of importance are presently fulfilled by the municipality. In summary, we want to find an aggregate $(\mathcal{B}, \mathcal{P}, \mathcal{W})$ where \mathcal{B} is the set of importance areas, \mathcal{P} is an aggregate of P_1, \dots, P_n , and \mathcal{W} is an aggregate of W_1, \dots, W_n and L_1, \dots, L_n .

3.2.1 Aggregating degrees of importance

Aggregating the importance orderings P_1, \dots, P_n of the important factors elicited through the survey would result in an ordering possibly involving seven times as many elements as the number of respondents. Furthermore, because there are no restrictions on the individual responses, the original importance orderings are disjoint. Therefore, we take an approach building on the technique outlined in Paulsson and Larsson (2021), by focusing on constructing an aggregate based on *degrees of importance* and *areas of importance*; the difference is that we here let surrogate numbers represent the different degrees of importance of the important factors before, rather than after, the important factors are clustered into areas of importance.

There is no obvious single interpretation of what an importance ordering entails in terms of degrees of importance. The most important factor provided by person x could be considerably more or less important to him, than the most important factor elicited by Y is for her. Moreover, the importance of the most important factor may or may not be affected by the total number of factors in an ordering. If the number of factors in an ordering would affect the distribution of degrees of importance it would resemble a form of point allocation. Conversely, if the number of factors would not affect the distribution, it would compare with direct rating. The sum rank method is reasonably stable under both scenarios for ordinal rankings (Danielson and Ekenberg, 2017). Therefore, the importance ordering positions will be transformed into degrees of importance, analogous to weights, by applying the sum rank method.

Because the aggregate is based on importance areas, i.e., clusters of congruous important factors, we assign intervals of degrees of importance to those areas, rather than fixed numbers, to reflect the distribution of the degrees of importance of the elements of each importance area. Moreover, intervals allows for informed subsequent sensitivity analysis, which is an important step in analyses with vague input.

Let $f(a_{i,k})$ be the degree of importance corresponding to the k :th important factor elicited by respondent i . Let $F_j = \sum_{a \in B_j} \frac{f(a)}{t(a)}$ be the sum of the degrees of importance assigned to the important factors in importance area B_j . The number $t(a)$ is the number of importance

areas of which a is an element—an important factor that has been assigned to more than one area of importance will share its degree of importance equally over those importance areas. The sum of the degrees of importance, rather than the average, is used to better reflect the number of elements in each importance area—the sum is guaranteed to increase with the number of elements in the set while the average is not. Doing so is analogous to adding an element of voting. For example, if an importance area contains importance factors from all the respondents’ importance orderings in a relatively large survey, the sum of the degrees of importance of its constituent factors is almost certain to be greater than the sum of degrees of importance of an importance area with considerably fewer elements.

To transform the sums of degrees of importance into importance-area weights, the former need to be normalized. Consequently, let

$$F'_j = \frac{F_j}{\sum_{l=1}^{|B|} F_l}$$

be the weight of importance area B_j .

We then form intervals with F'_1, F'_2, \dots as midpoints. The choice of interval is left to the discretion of the decision maker. However, solutions that upon analysis are found to lie too close to the endpoints require further investigation. Nevertheless, the intervals need to be sufficiently large to reflect a reasonable magnitude of the total imprecision involved in the survey responses. Therefore, for each importance area B_j , we form an interval around F'_j , extending equally far in the positive and negative directions, such that if we were to use the average as the midpoint of the interval it would cover 95 % of the values.

3.2.2 Aggregating levels of fulfillment

Aggregating the level of fulfillment is difficult. We assume that an important factor receiving a '+' is more fulfilled than one receiving a '0' (from the same respondent). However, we cannot assume that a respondent assigning a '+' to an important factor believes it is more fulfilled than a respondent assigning a '0' to the same important factor. However, while precise inter-respondent comparisons are not possible, we will assume that any respondents who assign the same level of fulfillment to the same important factor considers the intension of that level to be similar enough such that a presentation of the distribution of the responses over the different fulfillment levels is informative.

3.2.3 Aggregating the aggregates

For each area of importance, the distribution of fulfillment levels assigned to the important factors in that area of importance is presented together with the importance weight interval of that area of importance. Given such a presentation, the representatives of the municipality (and possibly the final decision makers) are asked to come with a complete importance ranking over the set of importance areas. Surrogate numbers generated based on the rank positions are then used as the stakeholder weights of the areas of importance. An uncertainty interval will be created for each importance area based on the importance weights and the variance of the fulfillment levels.

3.3 Evaluation

The evaluation of the value model is performed in two steps. The first is a simulation study and the second an interview study, both carried out upon completion of the value model. The focus of the first evaluation will be on the extent to which the value model meets the value propositions and objectives of the various stakeholders and documents. The second will investigate whether and how the value model makes sense to future users within the municipality's organization. The outcome of any of these evaluations may inform subsequent refinements of the value model.

4 Expected Results

A number of key results are expected from the strategizing process, the main one being a value model with which alternative strategies and action plans can be evaluated at different places within the municipal organization, thus supporting the municipality in strategically aligning its processes with the vision throughout the organization. Another important outcome is the map of the municipalities current objectives that can serve as a basis for future strategizing as well as creating a better understanding of how various parts of the organization relate at a strategic level, e.g., through shared or even conflicting objectives. Lastly, there is an aggregate representation of the citizens' and businesses' value propositions, and how well the proposed value model addresses those.

5 Discussion

Because organizational vision statements are inherently vague, it is difficult to discern if anyone, of several possible translations into actionable objectives, would be better than another for guiding the organization's actions in the direction of the vision. In the case of a municipality, not only should the objectives align with the vision statement, it should also accommodate the value propositions of stakeholders such as citizens and businesses. What constitutes a reasonable balance between stakeholder values and organization objectives is quite arbitrary and subjective. Yet, trade-offs should not be determined based on ad hoc discussions but rather be the outcome of comprehensive arguments such that the reasons and procedures for deciding on any particular prioritization of objectives are made transparent.

Given the size of even a smaller municipality, plus the involvement of citizens and businesses, the total number of objectives is likely to be very large. Consequently, there needs to be a balance between the number of proposed objectives and the value-model complexity for the value model to be useful. It is a decision problem in itself with no obvious solution. In this study we reasoned from the standpoint of applicability and let the number of strategic objectives be at most eight (c.f., (Alanne, 2004)). Considering that each strategic objective in turn could cover up to eight sub-objectives, thus covering a total of 64 fundamental objectives, it would still allow for addressing a wide range of issues. The exact number of objectives that an organization can handle will be highly dependent on its size, the number of business units, etc.

Aggregating the results of the survey into a meaningful set of objectives which then is merged with the objectives extracted from the various documents is complicated. First, there is the question about what is meant by something being more important than something else. Second, it is difficult to argue for a weight distribution when there is no common reference among the stakeholders' value propositions. Third, importance from the standpoint of the municipality may concern truly necessary utilities such as a sewage treatment plant, while some stakeholder values may include things that are, so to speak, nice-to-have. The solution may at first seem obvious but, clearly, if the too many of the nice-to-have-things are missing there will be no use of a sewage treatment plant because nobody wants to live in the municipality. That ties in with the issue of priority or weight: sometimes the achievement of certain objectives can be necessary for the value of other objectives to be realized, and at other times it is perfectly reasonable to allocate resources towards two or more objectives in order to optimize the total outcome, even if none of the objectives is fully completed.

5.1 Future research

The design of alternative future strategies of the organization should reasonably be informed by the objectives that those strategies are meant to fulfill. Means-objectives are particularly well-suited to serve as a guide when generating alternatives (Keeney, 1996). However, certain ways of addressing one particular objective may stifle attempts at addressing another—the constituent parts of a strategy must work as efficiently as possible together.

Let each possible way of addressing one or several objectives be called a strategy component. A complete strategy may then be constructed from a set of strategy components such that the objectives taken together are addressed in the most efficient way possible; interaction between strategy components may occur. The number of alternative strategies may quickly increase in a situation where several objectives possibly could be fulfilled in more than one way. Naturally, the number of alternatives to be presented before an evaluation must be sufficiently small. Morphological analysis (Ritchey, 2011) could possibly offer a basis on which to exclude certain combinations, leading to a stark reduction of alternative strategies. How to incorporate such a process into public strategizing will be further investigated.

Another matter of concern that most likely could be improved is the way stakeholders, such as citizens and businesses, are surveyed about their values. At the time of the survey there are, in the current setup, no clear references. Hence, making it difficult to compare the importance of values between different stakeholders. Value propositions ought to be collected in a way that conveys the relative strength stakeholders assign to them, thus making an aggregate prioritization and formation of objectives less arbitrary, thereby increasing impartiality. A common resource could possibly act as a reference of value.

6 Conclusion

The municipality of Kramfors has set out to develop a strategy for growth and development. The term growth is nebulous and its precise meaning depends to a large extent on the local conditions. Thereby, citizen participation constitutes an important component of the process. Moreover, a knowledge platform, produced by a consultancy firm in cooperation

with representatives from the municipality, describing the municipality's current position in light of the vision, and including strategic recommendations, has a large impact as well. Furthermore, the growth strategy must be adequately aligned with previously set high-level political objectives. A regional as well as a global perspective is considered by including objectives from the regional development strategy and Agenda 2030.

The growth strategy will, apart from laying out the fundamental objectives and a set of corresponding indicators, include an MCDA model for valuing and comparing alternative ways (e.g., action plans) for achieving the objectives, throughout the organizational hierarchy, such that some form of strategic alignment between units can be reached.

The current phase focuses on extracting objectives and indicators based on the material described above. It is necessary to strike a balance between generality and specificity. Overly general objectives may present themselves as difficult to construe and thus provide little, if any, support in striving in a particular strategic direction. Objectives that are too specific risk hog-tying the different parts of the organization and thus stymie creativity in the quest for effective solutions. Furthermore, to support the construction and evaluation of compromise solutions in terms of plans for realizing the objectives, equally appealing to citizens—including potential citizens—and businesses, careful attention is paid to the prioritization of objectives. The prioritization is based on input from citizens, businesses, municipal representatives as well as local politicians.

We are awaiting input from the municipality's organization developer as well as politicians to determine the set of reasonable objectives, the prioritization of those, and corresponding indicators for the value-model, while restructuring and improving the objectives hierarchies and networks due to new information.

Once the objectives, indicators, and value-model are ready and accepted by the politicians, the material will be handed over to a consultancy firm that in turn will produce the final written-up strategy document. The consultancy firm is informed of this particular study by way of emails and online in-person meetings. Lastly, an evaluation of the method will be performed based on feedback from representatives and politicians involved in the project.

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