

Preparation and Application of a Methodology to Obtain a Synthetic Opinion Indicator to Analyse the Context Conditions for the Development of the ICT Sector in Andalusia

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The Andalusian regional government approved on May 16th 2017 the "Strategy to Promote the ICT sector Andalucía 2020" (hereinafter, the TIC2020 Strategy). The purpose of this strategy is to promote the strengthening of the ICT sector in the region. Linked to the objectives of the TIC2020 strategy, 15 indicators have been defined, which should serve as a basis for evaluating the impact of the Strategy. These indicators relate the changes that will be experienced in Andalusia during the period of validity of the strategy with the contribution of the mentioned Strategy.

Among the defined indicators, the so-called "Synthetic Indicator of Conditions of Context of Development of the ICT Sector" is aimed at measuring the contribution of the Strategy to improving the conditions of the business environment for the Andalusian ICT sector. Therefore, this indicator should measure the opinion of Andalusian companies from the ICT sector about the evolution of the characteristics of the environment in which these companies operate, reflecting the impact of the aforementioned TIC2020 Strategy on the business context.

However, the TIC2020 Strategy does not include the method to be followed to obtain this Indicator. Thus, the objective of our research has been to define a methodology for calculating the indicator and apply it to a sample of workers in the Andalusian ICT sector, in order to obtain the initial value of the indicator.

For this, a synthetic index based on simple aggregation with equal weights has been defined. In addition, to estimate the weight of the factors that make up each component of the index and each component among themselves, the same criterion as in the Japanese TANKAN index and the Spanish INE Business Confidence Index has been used, where there are no weightings between the different factors. The TANKAN index is based on a statistical calculation that is governed by an opinion variable. This means that the methodology used is based on qualitative variables, which reflect aspects or areas of the phenomenon to be studied, and that the people participating in the study must choose between three possible alternatives (positive, negative and indifferent opinion) which is what better describes the situation, excluding seasonal factors (Sáez, 2014). On the other hand, the INE index chooses to use the simple balance without weighing between positive and negative responses, since it understands that the difference between using weighted and unweighted balances is irrelevant (INE, 2014).

The reasons that justify the use of this methodology are, on one hand, a justification from the operational point of view, since it is the most practical and viable of the available methods, as it allows us a fast integration of the results (Muñiz et al., 2006) as well as an immediate coordination between the different



intervening agents (INE, 2014). And on the other hand, there is justification from the empirical point of view, since at the time different options were considered through simulations, with minimum differences between the results obtained by this method and those obtained by others based on multivariate techniques, with greater complexity. Therefore, the result of these empirical tests is that the use of the TANKAN methodology is justified when it comes to estimating the opinion of specific business sectors (INE, 2014).

The proposed Synthetic Index has been the result of the arithmetic mean of three sub-indices, which measure each of the components of the context: Adequacy of Human Capital, Availability of Financing and Demand for ICT Products.

In turn, for each of these sub-indices the factors that make up the associated components have been defined. To define these factors, we have used a combination of qualitative research methodologies, mainly an analysis of the actions contained in each of the axes of the ICT2020 Strategy related to these components, based on the Thematic Analysis method, and a series of Nominal Group Techniques with a group of people from the business, financial, academic and administration world.

As a result, we have defined a synthetic index formed by the arithmetic average of a set of sub-indices, each of which corresponds to a component of the business environment and which are obtained based on the factors defined for each one of them. These factors have all had the same weight in the calculation of the sub-index, without considering any weighting. This is due to the fact that there is not a generalized consensus in the literature on the calculation of indices with respect to the need or not to use weights. Although there are authors who advocate the use of multivariate analysis statistical procedures when calculating an index since they allow to reflect the underlying relationships between the variables used, and hence, facilitate that these relationships are reflected and weighted in the final indicator (Saisana and Tarantola, 2002, Nardo et al, 2005, Castaño, 2011, among others), we have not found cases where weights are applied on opinion variables, which is the object of our research.

Once the three harmonized indicators have been obtained (i.e., the Synthetic Sub-Index of Human Capital Adequacy, the Synthetic Subindex of Availability of Financing and the Synthetic Subindex of Demand for ICT products), the Synthetic Indicator of Conditions of Development Context for the ICT Sector (hereinafter referred to as the ICT 2020 Index) has been the result of the arithmetic average of these three indicators, i.e.,

$$\text{ICT 2020 Index} = \frac{\sum_{i=1}^3 I_i}{3} \quad (1)$$

being I_i each one of the harmonized sub-indices.

It should be noted that the ICT 2020 Index may vary between -100 and +100. If the ICT 2020 Index is positive, this means that in the evaluation of the participants there are more positive opinions than negative ones regarding how the business environment conditions evolved in the year 2017.

As a result of all this, the Synthetic Index has been obtained for the year 2017, with a value of 9.81, as well as a work method that should serve as the basis for obtaining the index during the Strategy period. This possibility of repetition is especially important for our research, since it constitutes only the starting point of



this evaluation, which can only be completed when the indicator is calculated using the same method over several successive years.

Regarding the results obtained in the calculation of the indicator, the worst valued item is related to access to financing. In our opinion, this suggests that the Andalusian Public Administration should deepen the causes of this low valuation and if it is specific to companies in the ICT sector or it is common to the entire business sector. It is also the element where more factors depend on external issues, so it is necessary to assess whether the weight of these external factors, in which the TIC2020 Strategy has an indirect impact, is not excessive in the calculation of the Index. On the other hand, the demand for products and services from the Andalusian ICT sector is the element of the business environment of the ICT sector which has a more positive perception. Finally, with regard to the adequacy of Human Resources to the needs of Andalusian ICT companies, there is a high percentage of responses (around 55%) that consider that the situation remains the same. This may be due to different reasons, such as that Human Resources policies have a more medium-term effect, since they are linked in many cases to the implementation of study plans, so that the respondents have no direct relationship with the processes of selection or that there are problems related to this factor that companies in the sector understand that must be resolved. For this reason, we believe that deepening the reasons for these responses opens a potential line of research in this area.

In addition, certain restrictions and limitations have been found to the method of calculation proposed for this Index, derived fundamentally from the fact that in the methodology used there is no type of weighting of the answers, neither in terms of the context component nor in function of the opinion unit.

In short, the research carried out has provided a good view of the perception of Andalusian business persons in the ICT sector about the environment in which their activity is carried out and provides lines of work for both researchers and the Public Administration in this area. In addition, it has served as a starting point for future research, since if, as is foreseeable, the Index is calculated successively over the next few years, the evolution of this may be the subject of future researches.

