VALUATION OF BIOLOGICAL ASSETS UNDER IAS 41 – THE CASE OF LISTED AND LARGE COMPANIES IN CROATIA

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Abstract- There are many areas of accounting estimates when valuating biological assets under IAS 41 –Agriculture. Before the amendments to the standard in 2014, companies were required to measure all biological assets at fair value, which caused certain practical issues, especially when there was no active market. Previous research has shown that a significant number of companies applied the cost model as a result of not being able to estimate fair value reliably.Moreover there was general impression that the costs of measuring biological assets at fair value were higher than the benefits. Therefore, the IASB introduced changes to the standards related to biological assets, allowing companies to choose between the cost and the revaluation model, but limiting the scope to only bearer plants.. The aim of this paper is to analyze the practical challenges of applying IAS 41 before and after the revision of this standard. An empirical research was conducted in order to assess how these changes will affect companies in Croatia. The findings indicate that the effect is not expected to be significant, due to the fact that the proportion of biological assets in their balance sheet is relatively small and that the majority of them already value long-term biological assets using the cost model.

Indexterms- accounting estimates, biological assets, International Accounting Standards, fair value, Croatia.

I. INTRODUCTION

One of the most important qualitative characteristics of financial information are reliability and relevance, which can sometimes be in conflict. If the emphasis would be placed only on reliability, users of financial statements would base their decisions on generated cash flow and financial statements would be prepared on a cash basis. On the other hand, focusing on relevance would mean that the financial statements are prepared on the basis of the present value of future cash flows. It is necessary to find a balance between these principles, because extreme solutions would not provide users of financial statements with useful information for decision making.

Guided by the principle of relevance, management is allowed to estimate certain items of the financial statements when their value cannot be measured precisely. The objective of some accounting estimates is to forecast the outcome of one or more transactions, events or conditions. For other accounting estimates, the objective is to express the value of a current transaction of financial statement item based on conditions at the measurement date.

The purpose of the paper is to investigate the areas of accounting estimates related to valuation of long-term biological assets according to International Accounting Standards, as well as the challenges that arise when implementing the provisions of the relevant standards. Under International Accounting Standard 41 – Agriculture, biological assets have to be initially recognized at fair value less costs to sell, which is sometimes difficult to achieve in practice when there is no active market for a specific type of biological assets. Due to inability of the realistic assessment of the fair value, many companies end up applying the cost model. These practical issues have led to the changes in the IAS 41. The amendments refer to barer plants, such as fruit trees, which are excluded from the scope of IAS 41 and included in IAS 16 – Property, plant and equipment.

An empirical research was conducted in order to assess how these changes, which are effective for annual periods beginning on or after 1 January 2016, will effect companies in Croatia. The aim of the research was to explore how significant the item of biological assets is in the balance sheet of companies inCroatia, how many companies even have biological assets expressed in their balance sheets and what method they currently use for valuation of long-term biological assets. The research population refers to large and listed companies in Croatia, which are obligated to apply International Accounting Standards. The research has shown that the share of biological assets in total assets of analyzed companies is relatively small, which is a consequence of the structure of entities engaged in agriculture in Croatia, where family farms are dominant organizational form. Companies account for only 1.44% of entities registered for agriculture activity. When analyzing listed and large companies from the real sector with available financial statements for the year 2015, only 41 companies (10%) have the item biological assets in the balance sheet. The majority of these companies that have disclosed the method for measurement long-term biological assets use the cost model for certain biological assets due to a lack of realistic assessment of fair value, which supports the justification of the recent amendments to accounting standards related to biological assets.

II. VALUATION OF BIOLOGICAL ASSETS UNDER INTERNATIONAL ACCOUNTING STANDARDS

The term biological assets refers to living animals and plants which are a part of agricultural activity of the

company. During the process of biological transformation, there are two possible outcomes: 1) asset changes through growth, degeneration or procreation, or 2) production of agricultural produce (IASB, 2009, Para. 7). The first separate standard for agriculture activity (IAS 41 – Agriculture) was issued in 2000 and first applied to annual periods beginning on or after 1 January 2003. Until 2014, all types of biological assets were within the scope of IAS 41, together with the agriculture produce at the point of harvest and government grants. Relevant standards for the accounting treatment of other types of assets used in the agriculture activity are presented in Table 1.

Table 1. Relevant accounting standards for assets used in the agriculture activity before amendments to IAS 41

Type of asset	Relevant accounting standard
biological assets, agriculture produce at the point of harvest, government grants	IAS 41 – *Agriculture*
land related to agricultural activity	IAS 16 – *Property, plant and equipment* or IAS 40 – *Investment property*
intangible assets related to agricultural activity	IAS 38 – *Intangible Assets*
harvested product of biological assets	IAS 2 – *Inventories*

Source: IASB, 2009, Para. 1-3.

According to IAS 41 from 2009, biological assets should be measured at fair value less costs to sell, with all changes in the fair value included in income statement for the period in which they arise. Although this provision is intended to increase transparency and relevancy of accounting information, it may create practical issues and introduce a significant proportion of subjectivity. The ideal scenario is the situation where there is an active market for a specific type of biological asset, in which case the market price is used as a fair value. If a company estimates that there is no active market, it has to select the appropriate valuation model from the lower levels of the fair value hierarchy – market-determined prices or alternative estimates of fair value (Table 2). Accounting estimates are required especially when the asset is evaluated at the present value of expected net cash flows from the asset, since the input variables are highly judgmental and include projected cash flows, discount rate, growth rate, number of years in the projection and other key assumptions. All these inputs are effected by a number of externalities, such as climate change, adverse weather and market forces (Tan, Geat, 2013, p. 48), which makes predictions even more unstable. Exceptionally, when all measures of fair value are determined to be clearly unreliable, companies are allowed to use the cost model.

Table 2. Methods for measurement of biological assets

Conditions	Measurement
an active market exists	fair value less costs to sell
an active market does not exist, but market-determined prices are available	a) the most recent market transaction price, b) market prices for similar assets with adjustment to reflect differences, c) sector benchmarks.
an active market does not exist, market-determined prices are not available, but alternative estimates of fair value are reliable	present value of expected net cash flows from the asset discounted at a current market-determined rate
an active market does not exist, market-determined prices are not available and alternative estimates of fair value are determined to be clearly unreliable	cost less any accumulated depreciation and impairment losses

Source:IASB, 2009, Para. 20.

Therefore, there are many areas of accounting estimates when evaluating biological assets. The main issue related to accounting estimates in general is the degree of estimation uncertainty, which depends on the nature and reliability of information available to management, but is also affected by unintentional or intentional management bias (IFAC, 2009, Para. 2).

III. CHALLENGES WITH THE FINANCIAL REPORTING OF BIOLOGICAL ASSETS

IAS 41 was published with the aim to improve the comparability of financial statements in the agricultural sector, due to the lack of uniformity in the accounting methods applied (Bozzolan et al., 2016, p. 160). However, certain provisions of the standard have led to numerous debates on whether the objective has been met. Key issues that were identified during the practical application include the following: 1) difficulties in estimating the fair value, 2) single approach to measuring all biological assets, 3) the impact on earnings volatility and asset presentation, 4) the costs and benefits of using the fair value model for biological assets.

Previous research on difficulties in evaluating the biological assets

Regarding the potential problems with estimating fair value, there were concerns about the cost, complexity and practical difficulties of the fair value measurement of biological assets when an active market for these assets is not present (Bozzolan et al., 2016, p. 163; Brito et. al., 2014, p. 21). As a result, the valuation of biological assets at cost, which should be an exceptional case according to the standard, is a common approach in many countries of the world. Elad and Herbohn (2011, p. 136) conducted a research on companies from the private sector and revealed that the historical cost is still the most common valuation basis for biological assets in France. Moreover, the absence of an active market

also leads to companies using a variety of proxies for fair value, which does not contribute to the harmonization of accounting practices in agriculture. Empirical research confirms that the uniform application of IAS 41 does not exist (Scott et al., 2016, p. 140). The choice of evaluation method gives different values in several income statement items, leading to different results in financial statements analysis and company value (Rozentale, Ore, 2013, p. 66). As a consequence, the comparability of financial statements can be impaired.

Moreover, IAS 41 had a single accounting treatment for both bearer and consumable biological assets. The main distinction between these two types of biological assets consists in the fact that mature bearer biological assets are no longer undergoing biological transformation, which makes them similar to property, plant and equipment used in manufacturing (Damian et al., 2014, p. 721). The question is whether there is a need for determining the fair value of such assets, since there is no intention of selling and the fair value is more difficult to assess due to the non-tradable nature of bearer biological assets.

There are also concerns that the fair value model increases the volatility of earnings as a consequence of recognition of unrealized gains or losses from physical or price changes in biological assets. To isolate the effect of revaluating biological assets at fair value, there were cases where companies would prepare separate financial statements which are not based on IAS 41 (Elad, Herbohn, 2011, p. 135). Since not all of the biological assets owned by the entity are held for capital appreciation or sale, measurement at the fair value could lead to misleading information, because the revenue associated with these assets will never be earned and realized (Bozzolan et al., 2016, p. 162), and the profit is presented only on paper (Sedlaček, 2010, p. 66).

The debate on the advantages and disadvantages of the fair value accounting versus the historical cost accounting has been ongoing since the first introduction of the IAS 41 in 2000, still with no consensus. Despite its drawbacks, there are several potential benefits of measuring biological assets at fair value. Proponents of the fair value model emphasize that it provides more useful and transparent information due to timely reflection of current market value (Laux, Leuz, 2009, p. 826). When there are reliable market prices, fair valuation appears to be a simple valuation method. Tests performed by Argiles et al. (2011, p. 108) showed that cash flows are not less predictable with fair valuation than with historical cost, which means that there is no difference in the relevance of accounting information. Therefore, in ideal conditions the fair value model may have the advantage over the cost model. However, the actual conditions are often very different. Elad and Herbohn (2011, p. 135) conducted a research to investigate the perceptions of valuation consultants, accountants and auditors of agricultural businesses in Australia, France and United Kingdom regarding the implementation of IAS 41, revealing that there was a high level of agreement amongst all groups of respondents that the costs of applying fair value for biological assets outweighed the benefits. These issues were recognized by the standard setter (i.e. International Accounting Standards Board – IASB), which is why the version of IAS 41 from 2009 was amended in 2014, with the changes being effective from 2016.

Recent changes in accounting standards as a response to difficulties encountered

The IASB revised the standards because of the feedback received from participants in its 2011 Agenda Consultation, where the cost, complexity, reliability and relevance of measuring bearer plants at fair value were questioned (European Commission, 2014, p. 1). That is why the amendments to IAS 16 and IAS 41 included bearer plants, such as fruit trees and grapevines, which were included within the scope of IAS 16 instead of IAS 41. Bearer plant is defined as a living plant that: 1) is used in the production or supply of agricultural produce, 2) is expected to bear produce for more than one period, and 3) has a remote likelihood of being sold as agricultural produce, except for incidental scrap sales (IFRS, 2014, p. 4). The IASB decided that plants, which are used solely to grow produce over several periods, should be accounted for in the same way as property, plant and equipment, because their operation is similar to that of manufacturing (Commission Regulation (EU) 2015/2113, Para. 2). According to these amendments, companies can choose between the cost model and the revaluation model for bearer plants (Figure 1).

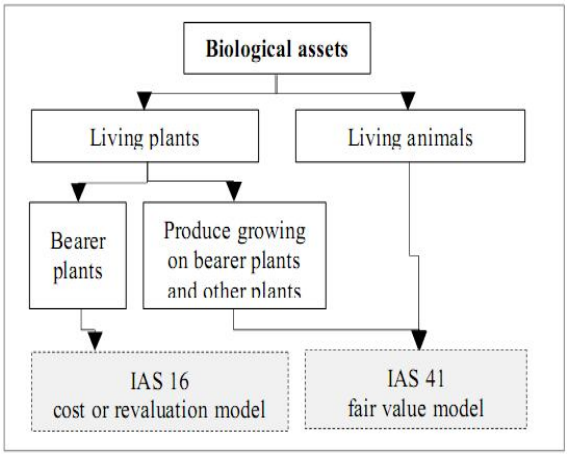


Figure 1. Amendments to IAS 41 and IAS 16 – revised requirements Source: IFRS, 2014, p. 5

The amendments provided by the IASB seem to address only some of the issues raised since the introduction of the IAS 41. The scope was restricted only to bearer plants, while bearer animals remain under IAS 41. Bearer livestock, like dairy cows and

animals held for breeding, may also be held solely for the produce they bear (EY, 2014, p. 2). Also, it is required to recognize bearer plants separately from its agricultural produce prior to harvest. Produce growing on bearer plants is still within the scope of IAS 41, which means that it should be measured at fair value.

Determining the point at which to recognize the agricultural produce separately, as well as estimating the quantity, quality and stage of growth of the produce while it is attached to the plant may be difficult to apply in practice (IFRS, 2014, p. 9; Bozzolan et al., 2016, p. 165). Assessing whether an asset meets the definition of a bearer plant may also require judgment and careful assessment. In some cases, it is not completely clear when a plant reaches maturity, whether an entity would need to reassess if the plant meets the definition of a bearer plant after the initial recognition, and if there is a remote likelihood for the asset to be sold.

Therefore, although major practical problems with estimating fair value for biological assets have been partly addressed by excluding bearer plants from the IAS 41, new issues regarding areas of judgment and accounting estimates have been raised.

IV. EMPIRICAL RESEARCH ON LARGE AND LISTED COMPANIES IN CROATIA

The aim of the research was to explore how significant the item of biological assets is in the balance sheet of companies in Croatia, how many companies even have biological assets expressed in their balance sheets and what method they currently use for valuation of long-term biological assets. The findings will indicate if the changes in the accounting standards related to agriculture were justified from the standpoint of Croatian companies.

Methods and research population

The preliminary analysis was conducted on the population of companies that are, according to the Accounting Act, obligated to publicly disclose their financial statements by delivering them to Financial Agency – Fina. In the year 2015, the total number of companies was 106,569.

All large companies, public interest entities and listed companies in Croatia are required to apply International Accounting Standards (Croatian Accounting Act, 2015, Art. 17; Regulation (EC) No 1606/2002 of the European Parliament and of the Council, Art. 4).

Therefore, in the second stage of the analysis the research focus was on large and listed companies from the real economy. When excluding companies whose financial statements were not available for the year 2015, the number of listed and/or large companies in the research population was 406 (Table 3).

Table 3. Number of companies in the research population

348 large companies from the real economy	154 issuers of securities on the ZSE
	- 24 financial institutions, cities, ministries
	= 130 issuers of securities on the ZSE from the real economy
= 478 companies from the real economy	
- 68 listed companies that are already included as large companies	
= 410 listed and/or large companies from the real economy	
- 4 listed companies without available financial statements for the year 2015	
= 406 listed and/or large companies from the real economy with available financial statements for the year 2015	
- 365 companies that have no biological assets on the balance sheet	
= 41 companies with presented biological assets on the balance sheet	

Source: calculated by the authors based on Financijskaagencija – FINA [Financial agency – FINA] and Zagrebačkaburza [Zagreb Stock Exchange]

A relatively small number of companies have biological assets presented in the balance sheet. These companies were identified in the next stage of the research. Measures of descriptive statistics were calculated to determine the proportion of biological assets in the structure of the total assets. Additionally, notes to the financial statement were analyzed in order to explore disclosed information on accounting estimates regarding biological assets, primarily the valuation method.

Research results

Agriculture in Croatia is considered to serve as an important strategic sector, which contributes to the GDP with around 4.4% (Eurostat, 2013). According to the Croatian Act on Agriculture (2009, Art. 2), entities engaged in agriculture may be organized in the form of: family farm, craft registered for agricultural activities, company or other legal entity. The proportion of companies in the total number of registered entities is only 1.44%, while family farms are a dominant organizational form (Table 4).

Table 4. Organizational forms of entities engaged in agriculture in Croatia

	2012	2013	2014	2015
Family farm	185,738	185,736	184,527	173,253
Craft	3215	3237	3009	2374
Company	2576	2732	2741	2495
Agricultural cooperatives	657	674	606	425
Other	197	213	215	200
Total	**192,383**	**192,592**	**191,098**	**178,747**

Source: Agencijazaplaćanja u poljoprivredi, ribarstvuiruralnomrazvoju [Paying agency for agriculture, fisheries and rural development], 2015

The significance of biological assets in the structure of total assets at the level of all companies from the real sector (106,569 entities) is relatively small, which was expected given the structure of entities registered for agriculture activities. The sum of long-term and short-term biological assets for analyzed companies in 2015 is 3.5 billion HRK, accounting for

0.32% of the aggregate total assets (Table 5). In the structure of aggregate biological assets, long-term biological assets have a majority share (59%).

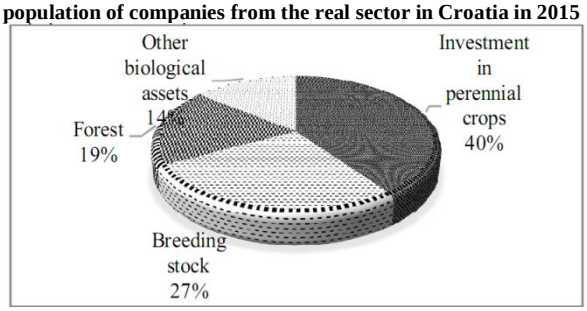
Table 5. The significance of biological assets in the structure of total assets at the aggregate level of all companies from the real economy in Croatia

aggregate short-term biological assets	1,444,824,439
aggregate short-term assets	359,894,690,119
proportion of short-term biological assets in total short-term assets	0.40%
aggregate long-term biological assets	2,088,521,219
aggregate long-term assets	720,072,116,165
proportion of long-term biological assets in total long-term assets	0.29%
aggregate total biological assets	3,533,345,658
aggregate total assets	1,091,185,994,471
proportion of total biological assets in total assets	0.32%

Source: calculated by the authors based on Financijskaagencija – FINA [Financial agency – FINA]

Since the scope of the changes in the accounting treatment of biological assets is limited on bearer plants, it is important to consider the structure of long-term biological assets (Graph 1). Investment in parental crops has the highest share, but it should be noted that the amendments to International Accounting Standards will only affect a small portion of companies from the real sector. A vast majority of companies apply Croatian Accounting Standards, namely the Croatian Accounting Standard 17 – Agriculture, which is in its main provisions the same as the IAS 41 before the revision.

Graph 1. The structure of long-term biological assets on the population of companies from the real sector in Croatia in 2015



Source: calculated by the authors based on Financijskaagencija – FINA [Financial agency – FINA]

Therefore, the further research was limited on large and listed companies in Croatia. The total number of entities in the research population is 406, which refers to all large and/or listed companies with available financial statements for the year 2015. The number of companies that have presented biological assets in their balance sheet is 41 or 10% of the research population. The majority of these entities belong to the section of activity C – Manufacturing (Table 6).

Table 6. Structure of the analyzed companies by section of activity

Section code	Section description	No. of companies	%
A	Agriculture, forestry and fishing	11	26.83
C	Manufacturing	17	41.46
G	Wholesale and retail trade; repair of motor vehicles and motorcycles	5	12.20
H	Transportation and storage	1	2.44
I	Accommodation and food service activities	7	17.07
Total	/	41	100.00

Source: calculated by the authors based on Financijskaagencija – FINA [Financial agency – FINA]

The sum of biological assets at the aggregate level of 41 analyzed companies is 1.5 billion HRK, which a significant amount considering that it refers to 41% of the sum at the level of all companies from the real sector. Proportion of total biological assets in total assets for these companies is 4.44% (Table 7). Long-term assets again dominate in the structure of aggregate biological assets.

Table 7. The significance of biological assets in the structure of total assets at the aggregate level of analyzed companies in Croatia

aggregate short-term biological assets	983,917,796
aggregate short-term assets	12,122,358,268
proportion of short-term biological assets in total short-term assets	8.12%
aggregate long-term biological assets	469,078,355
aggregate long-term assets	20,473,987,952
proportion of long-term biological assets in total long-term assets	2.29%
aggregate total biological assets	1,452,996,152
aggregate total assets	32,691,639,168
proportion of total biological assets in total assets	4.44%

Source: calculated by the authors based on Financijskaagencija – FINA [Financial agency – FINA]

In order to asset how the changes in the IAS 41 will effect these companies, an analyses of the disclosed information on the valuation method for biological assets was performed. The aim was to investigate what percentage of companies had problems with estimating the fair value reliably and therefore used the cost model for at least one type of biological assets. It is expected that the companies primarily used the cost model even before the revision of the IAS 41, although this was not the intention of the standard setters. Out of 41 analyzed companies, 25 of them have disclosed the valuation method for long-term biological assets in the notes to the financial statements, either directly or indirectly (Table 8).
Only 20% of the companies with the disclosed method used fair value, while 80% applied the cost model for certain biological assets. In addition to the

failure to publish the method of evaluation, it is noticeable that the companies do not fully comply with other disclosure requirements of IAS 41, especially regarding the reason why the company was not able to estimate the fair value reliably.

Table 8. Disclosed information on long-term biological assets valuation in the notes to the financial statements

Category of disclosure	Number of companies	%
Long-term biological assets not mentioned in the notes	12	29.27
Method of long-term biological assets valuation not disclosed	4	9.76
Company uses only fair value method	5	12.20
Company uses cost method for certain biological assets	20	48.78
Total	**41**	**100.00**

Source: calculated by the authors based on Financijskaagencija – FINA [Financial agency – FINA]

Discussion of findings

The research results indicate that the changes in IAS 41 and IAS 16 that became effective in 2016 are not going to havea significanteffect on companies operating in Croatia. Entities that are obligated to apply International Accounting Standards have a relatively small percentage of biological assets in the structure of total assets, especially when eliminating short-term biological assets.

When analyzing valuation methods of large and listed companies that have biological assets, the fact is that the majority of companies already values long-term biological asset at cost less accumulated depreciation and impairment losses. Since the revised standards allow companies to choose between the revaluation method and the cost method for bearer plants, it is expected that the companies will simply continue to apply the cost model as they did before, when the fair value was required. Since it is obvious that the companies generally encounter difficulties when estimating fair value reliably, which is in line with the results of the previous research conducted in other countries, the amendments to the accounting standards related to biological assets are justified and welcomed.

CONCLUSION

There are many areas of accounting estimates when valuating biological assets under IAS 41 – Agriculture. Since it was originally introduced, this standard has raised a lot of debates, especially regarding the costs and benefits of requiring companies to measure all biological assets at fair value. Key issues that were identified during the practical application include difficulties in estimating the fair value when there is no active market, single measurement approach that did not fit all types of biological assets, the impact on earnings volatility and assets presentation. Several previous researches revealed that the different groups of stakeholders considered the costs of applying the fair value for biological assets outweigh the benefits. There issues were recognized by the IASB, but were only partly addressed with amendments to the IAS 16 and IAS 41 in 2014. The most significant change is the exclusion of bearer plants (plants that are solely used to grow produce) from the scope of IAS 41 and the inclusion in IAS 16, which means that the companies can now choose between the cost model and the revaluation model for bearer plants.

Since a significant number of companies already applied the cost model for biological assets, as a result of not being able to estimate fair value reliably, the recent changes in accounting standards will have no major practical implications. This is confirmed on the population of large and listed companies in Croatia for the year 2015, the last year before the changes became effective. The research results indicate that only a small portion of companies that have disclosed the measurement method for long-term biological assets fully complies with the requirements of IAS 41 and measures all biological assets at fair value. On the other hand, most of the companies used the cost model for long-term biological assets, which has not been forbidden by the standards, but was intended to be an exception, rather than the rule.

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