ANTE PULIC

Measuring the Performance of Intellectual Potential in Knowledge Economy

(presented in 1998 at the 2nd McMaster World Congress on Measuring and Managing Intellectual Capital by the Austrian Team for Intellectual Potential)

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1. The Turn of Ages

In order to explain the measuring method to be presented in this article it seems to be essential to point out the fundamental starting point: **We left the industrial and have entered the knowledge-based economy.** More precisely, in the same way as the machine substituted human and animal work force a few centuries ago, knowledge has substituted manual work (in the factory as well as in the office) as a base for industrial production. This is the future that has already happened.

What we are experiencing today is actually a dramatic shift from material sources to knowledge, from hardware to software. Nowadays expansion and growth are basically based on knowledge. This new “production factor” has already substituted energy to a certain degree and natural sources as well, aiming to substitute routine work and finally physical capital.

“Economic growth can no longer come either from putting more people to work - that is, from more resource input, as much of it has in the past - or from increase in consumers’ demands. It can come only from a very sharp and continuing increase in the productivity of the one resource in which the developed countries still have a competitive edge (and which they are likely to maintain for a few more decades): knowledge work and knowledge workers.”

A whole new economical system has been trying to adapt to this transformation which is mainly visible in the transformed way of value creation. Remember how value was created during the industrial epoch: by quantifying the number of produced items. If you wanted to double your wealth you had to double production. This is no way you could operate nowadays, which leads us to the key point of the present economy system: **value creation is entirely based on knowledge!**

The traditional approach which, as Drucker states, although using sophisticated mathematical techniques and impenetrable sociological jargon, still define business as **buying low, selling high.** This is why costs were subtracted from income so that earnings could be calculated, and why so much attention was focused on costs. The new approach defines business as an organization which adds value and creates wealth. This is how the shift is made from costs to the creation of value.

It is here that the difference to former industrial economy is visible: Wealth creation was based on quantity and mass while knowledge economy creates wealth by employing creativity. How could this be realized? One of Microsoft's managers, Mr. Ballmer explained it quite simply: “We want to add more value every year for less money, that’s goodness.” Or a similar statement from George Egg, Strategic Planner, 3M Company: “We are trying to sell more and more intellect, and less and less materials.”

Some of you might consider these to be sporadic opinions of a few individuals but isn’t the most objective judge reality itself? The changes of wealth creation are visibly reflected on contemporary products and the strategies of contemporary companies.
As to the product, the most important trend to be accepted is the change of proportion of mass and information in products and services.

Take any modern product and compare it to its counterpart from 15 or more years ago. Comparing my first car, a MINI MORRIS with the CHRYSLER VISION I am driving today, the second one seems to be a space shuttle. When I remember my first PC XT produced in 1983 with a limited memory of 64 KB and look at the Compaq Armada, it seems to be like a dream.

Actually, computers are quite suitable for analyses since they are today what the steam engine was for the old economy. I hope we all can agree upon the fact that computers feature best the undergoing change of proportion between mass and knowledge in products and services.

I think that Gordon Moore, co-founder of US chip producer INTEL was one of the first to realize that the above mentioned change has already become a regular process in contemporary economy. Almost 30 years ago he put up the thesis that with steady prices the memory density of microprocessors would double every 18 months. This prophecy became true and entered industrial history as “Moor’s Law”.

What I have been trying to demonstrate is that today value can only be created by increasing intelligence of products and services. In order to achieve this knowledge is essential.

It means that companies have to face new challenges. In the previous period the company’s objective was to increase production and everything was subordinated to it. The objective of the modern company is to incorporate as much knowledge into products and services as possible. We are approaching the problem I shall elaborate. If it is possible to define the way of value creation, then it can be claimed that contemporary business shows a tendency to use more and more information and therefore requires more and more knowledge. Business success depends therefore on the ability and efficiency of using company knowledge.

And now we have approached the very actual topic of knowledge management in companies dealing with the question whether contemporary measuring systems keep up with the requirements of a new economy. We all know the answer, but the question is which measuring system would fulfil the requirements of new business environments and modern companies’ needs.

In my opinion this measuring system has to meet two requirements:

1. It has to establish reliable and objective evidence of value creation processes. This means precise measuring of knowledge which the employees incorporate into products and services.

2. It has to provide reliable and objective information on the employee’s ability to create value. In fact intellectual inputs and outputs are generally ignored by managers and investors, even though they far outweigh the assets that appear on balance sheets. There has to be a radical turn in modern economy because business success depends more and more on the intellectual potential of the employees. Or more precisely put by Walter Wriston, ex
president of Citicorp: “What we need is a way to measure the knowledge we bring to the work we do.”


Searching for a new measuring system the most developed concepts are represented by Stewart⁴, Edvinsson⁵ and Sveiby⁶. Their books were published in this order sharing the same title “Intellectual Capital”. Furthermore, they share the same approach. This concept is totally dominated by the definition of IC divided into three parts: human, customer and structural capital. At this moment many of us have accepted this division to be a standard.

But the problem arising from this approach is how to measure IC performance defined as such. For the analysis of human, customer and structural capital many indicators have been developed, but most of them being subjective which is also explicitly confirmed by the authors. In the end, after many evaluations, all three of them have come to the conclusion that one common indicator is necessary.

What do they need this common indicator for? Because, without it, problems considering the comparison of companies do arise. Sveiby faces this problem with his indicator Profit per Professionals as Edvinsson with his Organizational Intellectual Capital. Since Stewart has not defined that indicator, I would like to analyze the solutions they are offering.

Sveiby’s approach can be described as follows ⁷:

\[
\text{Profit per Professional} = \frac{\text{Profit}}{\text{Revenue}} \times \frac{\text{Revenue}}{\text{No. of employees}} \times \frac{\text{No. of employees}}{\text{No. of professionals}}
\]

General indicators of corporate success

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Sales efficiency</th>
<th>Personnel efficiency indicator</th>
<th>Leverage indicator</th>
</tr>
</thead>
</table>

What I see as the problem with this measuring system are first the elements - profit, revenue, number of employees - used for analysis. That revenue is a tricky indicator expressing corporate success can best be seen from the ranking lists published in Fortune Magazine. They have proved that with big revenue low business success can be achieved (General Motors according to MVA criteria). On the other hand, in contemporary economy profit is not an objective reflection of corporate success either. Therefore it is nothing else but archaism to use them as tools.

Another problem are the relations. The income per employee cannot be the indicator for corporate success. At last the relation between professionals and employees is not reasonable. The more professionals are among the employees the result tends to be lower (100/20=5, 100/50=2) and as all the results are multiplied, the final result is also lower.
Since the elements and the relations are questionable we can state that Sveiby’s general indicator expressing corporate success would be insufficient in order to satisfy the requirements of a modern measuring system.

How does Edvinsson deal with this problem? Although using over 169 indicators he claims that a general indicator ought to be defined in order to compare corporate success of two or more companies. He did this by introducing Organizational Intellectual Capital (OIC) in the last chapter of his book.

OIC is composed of revenues resulting from new business operations and investments in new markets, customers, training, education, patents and so on. This is the exact amount of money spent in a fiscal year. Now it is time to see how efficiently that investment has been used. This is indicated by the Organizational Capital Coefficient of Efficiency which is calculated by adding market share, satisfied customer index, leadership index, motivation index, index of R&D, index of training hours, performance/quality goal, employee retention.

The total has to be divided by the number of criteria in order to get an average indicating business efficiency. OIC can be calculated according to the following formula:

$$\text{Organizational Intellectual Capital} = i \times C$$

- $i$ = Intellectual Capital Coefficient of Efficiency (ICCE)
- $C$ = Intellectual Capital Absolute Measure

Can this solution be the basis for a new measuring system? I do not think so due to the following three problems I have traced:

- The first is the subjectivity of evaluation of Intellectual Capital Coefficient of Efficiency (“… apply some subjective judgments”)
- The second is the unequal importance of some indicators in various companies or branches which makes comparison impossible.
- The third is the decisive role of physical capital in calculating Organizational Intellectual Capital, which is in my opinion the major problem easily demonstrated by the following example:

<table>
<thead>
<tr>
<th></th>
<th>Edvinsson</th>
<th>^</th>
<th>XY</th>
<th></th>
<th>XZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>$i$</td>
<td>.85</td>
<td>.95</td>
<td>.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$C$</td>
<td>$200 mil.</td>
<td>$100 mil.</td>
<td>$400 mil.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$iC$</td>
<td>$170 mil.</td>
<td>$95 mil.</td>
<td>$200 mil.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If only the final results expressed in $ count, the OIC of the imaginary company XZ seems to be higher although it has a lower ICCE at the same time. On the other hand, the other company XY having the highest ICCE in the final score turns out to be less successful. And here we are facing the problem which we have been trying to avoid: presented in absolute figures the physical capital keeps the decisive role and not the employee’s ability.

According to the presented arguments both common indicators are not very convincing because they do not enable objective and precise measurement of the intellectual abilities of a company.
Whit reference to this I do not think that this concept could be a solution to measurement problems in knowledge economy. Since it is too broad, I don’t know how and where precise and objective evaluation of e.g. customer capital is possible. It contains too much subjective evaluation which does not enable comparison. Finally, its realization on the process level is unknown. The question arises how much a measuring system which cannot be realized inside a company is needed.

Now the field of measuring intellectual performance seems to be facing the same situation as routine work before Taylor. Only after he had established a measuring system for routine work, industrial organization was established. Nowadays something like this ought to be done for intellectual work. The aim should be precise and objective measuring of the efficiency of corporate knowledge which has been used. Precise, because there is no management without it, and objective, because there is no comparison without objectiveness.

3. Definition of Intellectual Potential and Intellectual Ability

In order to solve this problem it is essential to simplify the approach to the problem of measuring business performance in knowledge economy. The first question is where to start from? The approach I have developed takes reality as its starting point, which is as follows: each economic action finds its evaluation at the market which is expressed in monetary terms through the financial result. And this is the start and the end of any economic action, the essence of a company’s existence. Through the results achieved on the market a company obtains its orientation concerning the efficiency of its actions.

This leads us to the dilemma whether intellectual efficiency ought to be expressed in monetary or non-monetary terms. Sveiby is determined: “Knowledge flows and intangible assets are essentially non-monetary.” He also mentions that non-monetary indicators also exist in traditional industries, e.g. ton per hour, as well as the necessity of expressing customer satisfaction in not necessarily monetary ways.

Edvinsson has a similar opinion claiming that: “Employees are not all of intellectual capital”. Therefore we see the market as an objective criterion on the one hand and on the other hand the persistence on subjective evaluation systems measuring corporate success. Which way is the right one? As mentioned before, we have chosen to take the way of reality. But what is reality like? The new knowledge-based economy aims to create value whereby it is expressed in monetary terms. Well, as long as business results are expressed through money, monetary criteria are the only base for a new measuring system.

In order to create value added, the main goal in a knowledge based-economy, we need a certain amount of physical capital, and intellectual potential. The intellectual ability of a company shows how efficiently they have been used. Therefore we have based our analysis on the following four parameters.

1. There is not much to say about value added (VA) since everyone agrees upon the importance of that category, as far as knowledge-based economy is concerned. David R. Vince takes it in his book The information-based economy as a basis for expressing company success. Furthermore,
Sveiby describes the value added per professional as the “purest measure of ability to produce economic value.” In this method value added also represents the most objective result of business performance.

In order to create value nowadays two resources are essential in the knowledge based economy: physical capital and intellectual potential.

2. **Physical capital (CA)** is not hard to define. It includes all necessary financial funds. We calculate it as the sum of the following positions from the balance sheet: equity, open reserves, funds for general banking risks, supplement capital, participation capital, and lower ranking capital. Then we add the after tax profits. This is the total amount of physical capital a company has at its disposal.

3. In my approach the **Intellectual potential (IP)** of each company is represented by all of its employees. We understand it as the ability of the employees doing their daily routine creating value. This potential includes their abilities in creating value by efficiently using the company’s infrastructure as well as in intensive relation with their environment, the market.

Let us point out the difference between intellectual potential and intellectual capital. There are at least two differences. First, intellectual capital has been divided into human, structural and customer capital. Our approach supposes that neither structural nor customer capital could function without the employees as the decisive business factor. Second, the indicators expressing intellectual capital tend to be subjective very often. Contrary to that calculations of intellectual potential and intellectual ability are based on real, objective market results, according to our approach. This is where the main difference between this two approaches is.

In the knowledge-based economy the responsible party for the achieved market results are definitely the employees. They represent the integration factor of two distant poles. First, they are the cohesion factor of the inner structure of a company through which products and services are created. We are of course talking about organizational structure and all the additional contents - information bases, technical support - which form the base for business success. And second, they form the connection with the market - the clients. Who else than the employees could build the organization of a company? Who else could customer satisfaction depend on than on the relationship the employees have build? Therefore, at the end business is based on the employees.

Why do we use the term intellectual potential? Because it is a very dynamic category. We could make a comparison. Let us take the water flowing in a river. That potential can be used in different ways. For example, it could be used as a fishing pond or for tourist needs. Depending on the way that potential is used will also be its business performance. The same happens to intellectual potential - its performance depends on all the employees, organizational conditions and communication with the market.

The computer company APPLE can serve as an example for the dynamics of IP. From a company which introduced a new epoch in human history it came down to a problematic producer of computers fighting for survival before entering the deal with Microsoft in 1997. And this is not a
lonely case. The example of Saachi & Saachi only confirms the theory that the IP of a company constantly varies.

The intellectual potential is not easily defined. Trying to determine it we come back to reality. As business performance is measured in monetary terms it is also necessary to express intellectual potential in the same way. In our approach, **IP is expressed by the overall expenditures for the employee’s salaries.**

Why this choice? First, because there is no other as long as there is a market. Second, in the knowledge based economy three main categories have been crystallized out: production routine work, routine work in services and analytic work. Today it is well known how much work in each of those categories is paid for. And finally the market had discovered IP even before the managers did. That same market defines the salaries but also the results of their performance, therefore it is only logical that their success should be expressed by the same criteria.

In this method labor expenditures are not only seen as compensation for invested time but also as compensation for knowledge inputs. How else could the extreme differences in salaries and wages be explained but with various knowledge levels and different abilities of the employees? Of course, this statement attracts some criticism but seems to be a promising way of attaching IP to business performance.

A similar position is also taken by P. Strassman. In his article *The Value of Computers, Information and Knowledge* he introduced a method of measuring management productivity. He measures management success by his indicator information productivity. Strassman establishes a very simple relation between management value added and management expenditures - General, Sales and Administrative expenses. As a result he achieves the coefficient Return of Management which indicates how successfully management manages physical capital and intellectual potential. **Strassman’s concept was the first one, according to reality, to consider the employees, in this case management, to be a factor participating in corporate success.** I would like to remind you that the employees were calculated as expenditures and treated the same way as spare parts, energy etc.

In contrast to Strassmann who takes only management into account, I think that it is more realistic to take all the employees into account, because corporate success depends on all of them. A good management with bad executives or the other way round cannot be successful in the long run. The optimum is achieved by a successful whole, demonstrated by new network organizations. Therefore the labour expenditures are in this method treated as a realistic indicator for the intellectual potential used in a company.

4. **Intellectual ability** of a company is the result of employed physical capital and intellectual potential. It indicates how successfully value added was created. In knowledge based economy the objective is to create as much value added as possible with a given amount of physical and intellectual capital. As you can see from the following examples, companies achieve entirely different results by employing similar resources. The intellectual ability of a company shows precisely how successfully its physical capital and intellectual potential have been used.
Therefore, we consider it a universal indicator showing the intellectual abilities of a company in value creation and representing a measure for business efficiency in knowledge based economy.

4. The Logic of the VAIC™ Method

Trying to solve the problems of measuring the performance of intellectual potential the method of Value Added Intellectual Coefficient - VAIC™ - emerged. We would like to demonstrate how important information about the efficiency of intellectual potential within a company and an economy is. Calculating the efficiency of physical capital and intellectual potential is very easy and takes four steps:

First of all, we have to find out how a company is able to create value added. Value added (VA) is the difference between sales (OUT) and inputs (IN):

\[ \text{OUT} - \text{IN} = \text{VA} \]

Output (OUT) represents the overall income, all the products and services sold on the market. Inputs (IN) contain all the expenses, everything that came into the company. It is important to point out that labour expenses were not calculated into input. Because of the active role in the value creating process, intellectual potential (represented by labour expenses) cannot be counted as costs any more. This is the key point of my method. To put it shortly: input is costs except labour expenses. The result is value added (VA) expressing the new created wealth of a period.

The next step is to calculate how efficiently this value added was created. Value added grows out of physical capital and intellectual potential. It does make a difference whether a given value added could be achieved by 10 or 100 employees, as well as it matters, if 10 or 100 millions of funds (CA) have been used. Thus the goal is clear: create as much value added as possible with a given amount of physical capital and intellectual potential. Therefore we have to know how successfully these resources were managed.

It is easy to get an answer: the achieved value added is put into relation with both resources necessary to create it.

The second relation of value added and employed physical capital (CA) is called Value Added Capital coefficient - VACA:

\[ \frac{\text{VA}}{\text{CA}} = \text{VACA} \]

This is an indicator for the value added created by one unit of physical capital. The following example shows us how important this information is (all examples are real):

<table>
<thead>
<tr>
<th>Bank</th>
<th>CA</th>
<th>VA</th>
<th>VACA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Die Steiermärkische</td>
<td>3,552</td>
<td>1,619</td>
<td>0.46</td>
</tr>
<tr>
<td>Tiroler Sparkasse</td>
<td>3,299</td>
<td>843</td>
<td>0.26</td>
</tr>
</tbody>
</table>
In this example, “Die Steiermärkische” creates 0.46 $ VA out of any $ physical capital, while its competitor “Tiroler Sparkasse” makes only 0.26 VA. In other words: “Die Steiermärkische” doubled the value added compared to “Tiroler Sparkasse”. Therefore, VACA indicates how efficiently physical capital has been employed.

The labour expenditures are not calculated as costs any more but represent an active component of value creation. The third relation is therefore Value Added Intellectual Potential - VAIP - Coefficient demonstrating how successfully intellectual potential creates value:

\[ \frac{VA}{IP} = VAIP \]

The relation between VA and the IP expressed through accumulated expenditures for labor, indicates the IP for value creation in a company or national economy. As the indicator mentioned before, VAIP shows how much value added was created by 1 $ spent on the employees.

We have now a tool for measuring the efficiency of employed physical capital as well as the performance of intellectual potential, the two resources no business activity could be possible without. I would like to highlight that both indicators are perfectly precise and fully objective because they are calculated on real facts.

Let us have a look at the performance of these two indicators of business success. The following example demonstrates how value added doubled while maintaining the same physical capital and a slight rise in IP. Both coefficients have precisely noted that.

<table>
<thead>
<tr>
<th>Year</th>
<th>CA</th>
<th>IP</th>
<th>VA</th>
<th>VACA</th>
<th>VAIP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>113</td>
<td>43</td>
<td>40</td>
<td>0.36</td>
<td>0.95</td>
</tr>
<tr>
<td>1995</td>
<td>114</td>
<td>48</td>
<td>81</td>
<td>0.71</td>
<td>1.68</td>
</tr>
</tbody>
</table>

This is also a good chance to see how important IP in a company is: if the physical capital remains the same and VA doubled within a year it should be obvious whose merit it was.

The fourth step, the intellectual ability of a company represents a unified picture of used physical capital and intellectual potential. You get intellectual ability of a company by counting up the two coefficients, which results in a new and unique indicator:

<table>
<thead>
<tr>
<th>Year</th>
<th>CA</th>
<th>IP</th>
<th>VA</th>
<th>VACA</th>
<th>VAIP</th>
<th>VAIC™</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>113</td>
<td>43</td>
<td>40</td>
<td>0.36</td>
<td>0.95</td>
<td>1.31</td>
</tr>
<tr>
<td>1995</td>
<td>114</td>
<td>48</td>
<td>81</td>
<td>0.71</td>
<td>1.68</td>
<td>2.39</td>
</tr>
</tbody>
</table>

The received coefficient - Value Added Intellectual Coefficient - VAIC™, indicates the efficiency of the employed potential of a company, financially as well as intellectually. Why do we need a general indicator for corporate success? As mentioned, before this method aims at creating as much value added with a given amount of physical capital and intellectual potential, which is best shown by the following:
Here you can see the two crucial points of the method:

The first is the above mentioned objective. You could notice that although physical capital was reduced during three years for 25% VA did rise for 25%. VAIP indicates the decisive factor of that success: with only a slight reduction of IP major increase of VA. Both components of value creation can be traced, monetary and intellectual being perfectly objective due to figures taken from the market.

Second, the VACA and VAIP coefficients demonstrate why a general one should be introduced. In 1995, VACA increased and VAIP was reduced. How can we see if business got better or worse in relation to the previous year? VAIC™ indicates the overall state of corporate ability, in this case a slight improvement.

Here comes the crucial point indicating why VAIC™ is important for a future oriented business analysis: What can managers do, when they perform comparable value added with equivalent physical capital?

But still there are some interesting examples: “Schoeller” and “Stm. Hypo“do have comparable amounts of physical capital and VA. If you stick only to these two indicators, a shareholder would assume these banks were equally successful.

With VAIC™ we can acknowledge reality:

The example above describes such a situation: nearly identical physical capital, the same value added and the same VACA but “Stm. Hypo“ employed only 70% of intellectual potential compared to “Schoeller“. This difference can be demonstrated only after an analysis of intellectual potential.

This is the crucial point: The performance of intellectual potential can be measured and therefore it is open for management intervention. VAIC™ is the proper tool to do it.

These companies achieved comparable value added figures with different employment of intellectual potential. The VAIP-ratio demonstrates that intellectual potential is of crucial
importance. So this is a good reason for the necessity of VAIP and VAIC™ in any business analysis.

5. IP in Two National Economies

The performance of intellectual potential can according to the demonstrated logic of VAIC™ be traced at all levels: national economies, sectors, companies and most important inside the company. This method was empirically analyzed on 200 Austrian companies from 14 different sectors and 400 Croatian companies with the biggest revenues. Here are some global results.

Our prime interest was the relation between physical capital and value added, whereby the results are shown on the following two graphs - first the Austrian and then the Croatian economy.
The indicated relation is not too big in the Austrian economy as is also seen in the Croatian economy. These two examples confirm that physical capital is not the determinant for value creation in knowledge economy. This is also confirmed by the next two graphs: the correlation between value added and intellectual potential is very high in both Croatian and Austrian economy.
It can be stated that the global results are almost identical in both economies: **we have evidence that value creation depends much more on intellectual potential than on physical capital.** Knowledge economy with knowledge work and knowledge workers is reality. I would like to point out that Strassman obtained the same results using different data. He was analyzing the expenditures for informational technology in relation to business success and came to the conclusion that no correlation could be found. Then he took the expenditures for management and put them in relation to business success. This time the result was a high degree of correlation.\textsuperscript{xii} **Both cases prove that a high degree of correlation between the labor expenditures and corporate success exists.**

This empirical analysis provided also other results. The example of the Croatian economy is very interesting for various reasons. It is important to realize that we are dealing with an economy at the level of app. 4,000 $ GNP per capita while the Austrian level is app. 20,000 $ GNP per capita. It is fascinating to see that the same results were achieved although the Austrian economy is 5 times more developed than the Croatian one. This only proves the **global economy laws are functioning regardless of a developed or undeveloped economy.**

This example also helps to solve the problem of labour expenses indicating IP. Well, my colleagues have basically argued against the method that a higher coefficient could be achieved with lower wages. More clearly: if VA is divided with lower IP a higher indicator for the efficiency of the employees is achieved. That way we could get the impression that it would be enough to cut labour expenditures in order to achieve better results. Mathematically that is correct. But the example of the Croatian economy highlights a very important side of the problem: low wages create low value and vice versa. Or put in other words: American VA cannot be achieved with African salaries. The point is therefore VA creation and not height of the wages.

And here is the proof: comparing the performance of 24 Austrian and 30 Croatian banks in both economies the following results have been obtained:
Average:

<table>
<thead>
<tr>
<th></th>
<th>HR</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>efficiency of physical capital</td>
<td>0.213</td>
<td>0.303</td>
</tr>
<tr>
<td>efficiency of intellectual potential</td>
<td>1.518</td>
<td>1.904</td>
</tr>
<tr>
<td>total efficiency</td>
<td>1.731</td>
<td>2.207</td>
</tr>
</tbody>
</table>

If the wages in Croatian banks are 4 times smaller than the Austrian ones one could suppose that their VAIC™ is also 4 times higher. But that is not the case, the Austrians receive higher wages and their banks are more successful because their IP creates more value. **Therefore labour expenditures have proved to be an objective indicator for IP.**

Finally, the analysis has shown that comparisons of corporate success can be carried out in companies from different national economies. Why is that so? Because we are using relative indicators. The relation between value added and IP indicates how efficient the employees were, regardless of the national economy. Therefore the results can be compared.

As an example I am taking an Austrian and a Croatian bank:

<table>
<thead>
<tr>
<th></th>
<th>CA</th>
<th>IP</th>
<th>VA</th>
<th>VACA</th>
<th>VAIP</th>
<th>VAIC™</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIE STM</td>
<td>3,522,167</td>
<td>1,063,761</td>
<td>1,618,978</td>
<td>0.460</td>
<td>1.522</td>
<td>1.982</td>
</tr>
<tr>
<td>ZABA</td>
<td>3,609,975</td>
<td>760,820</td>
<td>1,293,474</td>
<td>0.358</td>
<td>1.700</td>
<td>2.058</td>
</tr>
</tbody>
</table>

Both banks analyzed had almost the same physical capital but created different value added. Let us see why. The STM bank makes better use of its physical capital but worse of IP. The ZABA bank achieves lower results with physical capital but is more successful when the IP is measured. In the end ZABA appears to be more successful.

One more comparison:

<table>
<thead>
<tr>
<th></th>
<th>CA</th>
<th>IP</th>
<th>VA</th>
<th>VACA</th>
<th>VAIP</th>
<th>VAIC™</th>
</tr>
</thead>
<tbody>
<tr>
<td>VORARL</td>
<td>3,280,682</td>
<td>439,727</td>
<td>1,196,576</td>
<td>0.365</td>
<td>2.721</td>
<td>3,086</td>
</tr>
<tr>
<td>ZABA</td>
<td>3,609,975</td>
<td>760,820</td>
<td>1,293,474</td>
<td>0.358</td>
<td>1,700</td>
<td>2,058</td>
</tr>
</tbody>
</table>

Here the ZABA bank is compared with a bank having less physical capital but employed it equally successfully, which is indicated by similar results (VA). The only obvious difference noted is with the IP used. The ZABA bank is employing almost twice the IP, and that is why the VORARL bank proved to be more successful.

In the same way the branch offices of a global company can be compared, which is the major advantage of this method.

**6. Intellectual Potential in a National Economy**

While analyzing the IP of various branches of a national economy, the differences in performance are evident. There are branches where only small VA is created while a lot of physical capital is invested, or others where a small amount of physical capital creates serious VA. According to that
the whole economy could be divided into areas of higher or lower intelligence. The branches working with lower VAIC™ are construction industries as well as most of the traditional industries. On the other hand the modern electronic companies, media and wholesale trade possess a high intellectual coefficient. An interesting observation is that both economies, the Austrian and the Croatian, show this division. One more proof for the global appliance of knowledge based economy.

The analysis inside a branch is even more interesting and this example shows why it is necessary:

<table>
<thead>
<tr>
<th>Company</th>
<th>CA</th>
<th>IP</th>
<th>VA</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOBACCO ROVINJ (TFR)</td>
<td>399491</td>
<td>36281</td>
<td>228568</td>
</tr>
<tr>
<td>TOBACCO ZAGREB (TFZ)</td>
<td>419994</td>
<td>59290</td>
<td>113968</td>
</tr>
</tbody>
</table>

This example of two tobacco factories shows how the intellectual abilities differ within a branch. If the Tobacco factory Rovinj (TFR) makes twice the VA than the Tobacco factory Zagreb (TFZ) by having less labour expenditures and less physical capital it should be a reason for the TFZ to reanalyze its business.

Here is an example from wholesale where companies use their physical capital and IP more or less successfully.

<table>
<thead>
<tr>
<th>NR</th>
<th>Company</th>
<th>CA</th>
<th>IP</th>
<th>VA</th>
<th>VACA</th>
<th>VAIP</th>
<th>VAIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AWT INTERNAT.</td>
<td>4,313</td>
<td>7,275</td>
<td>11,946</td>
<td>2.770</td>
<td>1.642</td>
<td>4.412</td>
</tr>
<tr>
<td>2</td>
<td>KRKA FARMA</td>
<td>5,029</td>
<td>10,386</td>
<td>12,115</td>
<td>2.409</td>
<td>1.166</td>
<td>3.576</td>
</tr>
<tr>
<td>3</td>
<td>FARMACIJA</td>
<td>92,313</td>
<td>22,719</td>
<td>48,745</td>
<td>0.528</td>
<td>2.146</td>
<td>2.674</td>
</tr>
<tr>
<td>4</td>
<td>MEDIKA</td>
<td>165,475</td>
<td>55,074</td>
<td>85,093</td>
<td>0.514</td>
<td>1.545</td>
<td>2.059</td>
</tr>
<tr>
<td>5</td>
<td>TEKSTILPROMET</td>
<td>111,364</td>
<td>23,382</td>
<td>37,506</td>
<td>0.337</td>
<td>1.604</td>
<td>1.941</td>
</tr>
<tr>
<td>6</td>
<td>ELEKTROMATERIJAL</td>
<td>52,437</td>
<td>27,225</td>
<td>34,193</td>
<td>0.652</td>
<td>1.256</td>
<td>1.908</td>
</tr>
<tr>
<td>7</td>
<td>ELEKTROPROMET</td>
<td>136,736</td>
<td>20,092</td>
<td>32,693</td>
<td>0.239</td>
<td>1.627</td>
<td>1.866</td>
</tr>
<tr>
<td>8</td>
<td>EXPORTDRVO</td>
<td>208,761</td>
<td>29,646</td>
<td>44,291</td>
<td>0.212</td>
<td>1.494</td>
<td>1.706</td>
</tr>
<tr>
<td>9</td>
<td>BRODOMERKUR</td>
<td>207,440</td>
<td>40,528</td>
<td>46,263</td>
<td>0.223</td>
<td>1.142</td>
<td>1.365</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>983,868</td>
<td>236,327</td>
<td>352,845</td>
<td>0.359</td>
<td>1.493</td>
<td>1.852</td>
</tr>
</tbody>
</table>
This analysis of a sector/branch shows what the IP of a company really means. Let us compare the first and last on the ranking list. The last company employs 48 times more physical capital and 5.5 more IP. Actively using all of its resources, it creates only 3.8 times more VA. We can see it from the int. coefficients of the analyzed companies. Therefore also the division into more and less intelligent ones.

The companies 5 and 6 on the list create similar VA but do not use their resources in the same way as is noted by this new measuring system. One company employs its physical capital better, the other one its IP. VAICTM, the value added intellectual coefficient, indicates which company is doing better business.

7. Intellectual Potential of a Company

We are now facing a field where the new measuring system is most useful. It is not superfluous to compare different national economies but information about IP performance is really vital in company business. I will demonstrate on two examples possible ways of using the VAICTM measuring method inside a company.

And here is an analysis of a forwarding agency with 6 branch offices carried out through a period of three years. I will present you some general information first.

<table>
<thead>
<tr>
<th>Year</th>
<th>OUT</th>
<th>IN</th>
<th>VA</th>
<th>CA</th>
<th>IP</th>
<th>VACO</th>
<th>VAIP</th>
<th>VAICTM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>12,373</td>
<td>6,455</td>
<td>5,918</td>
<td>5,222</td>
<td>5,072</td>
<td>1.133</td>
<td>1.167</td>
<td>2.300</td>
</tr>
<tr>
<td>1995</td>
<td>9,953</td>
<td>4,292</td>
<td>5,661</td>
<td>5,328</td>
<td>5,323</td>
<td>1.063</td>
<td>1.063</td>
<td>2.126</td>
</tr>
<tr>
<td>1996</td>
<td>8,847</td>
<td>3,733</td>
<td>5,114</td>
<td>5,122</td>
<td>4,681</td>
<td>0.998</td>
<td>1.093</td>
<td>2.091</td>
</tr>
</tbody>
</table>

As you can see throughout the years, there is a constant fall of VA. The exploitation of physical capital is constantly falling. The success of IP in 1996 rose a little but the physical capital was not used well. Therefore VAICTM, the intellectual ability of a company, keeps falling during the last three years. What is necessary now is further analysis in order to determine the company parts performing badly. The analysis of IP performance in all branches has given these results:

<table>
<thead>
<tr>
<th>Year</th>
<th>BO 1</th>
<th>BO 2</th>
<th>BO 3</th>
<th>BO 4</th>
<th>BO 5</th>
<th>BO 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>1.148</td>
<td>3.772</td>
<td>1.340</td>
<td>1.572</td>
<td>1.404</td>
<td>1.597</td>
</tr>
<tr>
<td>1995</td>
<td>0.830</td>
<td>2.144</td>
<td>1.728</td>
<td>1.044</td>
<td>0.950</td>
<td>1.281</td>
</tr>
<tr>
<td>1996</td>
<td>0.758</td>
<td>1.966</td>
<td>1.350</td>
<td>1.394</td>
<td>1.205</td>
<td>1.311</td>
</tr>
</tbody>
</table>

We have determined precisely that in BO 1 and BO 2 IP performance has been constantly falling. In BO 4, BO 5 and BO 6 a rise is noted after the fall but never reaching the success of 1994. Only BO 3 performed better in 1996 than in 1994. Although all these figures would be enough for action, a more detailed analysis is carried out in order to determine the critical points in IP employment.

How does VAICTM measuring system function in everyday business? The whole concept is based on the simple realization that the company is involved in business processes which are
necessary to define. Therefore, the whole company is divided into such processes which are then easy to analyze. The way of doing it can be shown by a simple example: take a company which produces two articles. Such a value added chain consists of at least three activities:

<table>
<thead>
<tr>
<th>PRODUCT 1.</th>
<th>MODEL</th>
<th>PRODUCTION</th>
<th>MARKETING</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRODUCT 2.</td>
<td>- develop.</td>
<td>- realization</td>
<td>- service</td>
</tr>
<tr>
<td>PRODUCT 1.</td>
<td>- design</td>
<td>- logistics</td>
<td>- sales</td>
</tr>
</tbody>
</table>

Each of these processes creates value added which can be followed.

This can be seen even more clearly when the IP of all processes within the whole company are taken and the following information obtained:

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>MODEL</th>
<th>PRODUCTION</th>
<th>MARKETING</th>
<th>COMPANY</th>
</tr>
</thead>
<tbody>
<tr>
<td>PR1 3.0</td>
<td>4.0</td>
<td>2.0</td>
<td>5.0</td>
<td>3.0</td>
</tr>
<tr>
<td>PR2 2.6</td>
<td>2.0</td>
<td>2.8</td>
<td>3.0</td>
<td>2.8</td>
</tr>
</tbody>
</table>

In the above example the VAIP coefficient of every process indicate where the weakest points in a company are: with product one it is PRODUCTION and with product two it is MODEL. After intervention at those points the weakest point was PRODUCTION with product 2. By applying the VAIC™ method of measuring corporate success with its VACA and VAIP indicators total control over business performance can be achieved.

Intellectual potential creates value, so it must be managed. This is done by seeking those parts of the process in which the contribution of intellectual potential is the lowest and then either improve or remove these places.

8. Conclusion on the Application of the VAIC™ Method

For approximately 200 years corporate success has been measured only by the criteria of efficiency of physical capital. In the beginning the rate of profit was indicating how much profit could be expected from 1 unit of invested capital. Later on, investors wanted to know amortization time of investments, DuPonts ROI became widespread, and during the 80ies the Shareholder Value Analysis (SVA) became very popular. The last years brought the rise of Economic Value Added (EVA) analysis, which indicates real gains or losses of capital during a certain period of investment.

“All recent changes and improvements in accounting - such as activity-based costing, the executive scorecard and economic value analysis - still aim at providing better information about events inside the company.”

The VAIC™ method appears to be a logical continuation of measuring corporate success, providing more detailed information about the situation inside a company.
What is the advantage of VAIC™ in regard to other concepts?

1. It is the first method to measure IP performance objectively, starting at company levels to national economies. The major problem of modern economy could be put this way: there are different ways for measuring the performance of physical capital but as for now only this method succeeds in measuring IP. None of the well known methods like profit rate, ROI, SVA, EVA and others do offer a solution. Why? Because they are based on the analyses of only the physical capital. But the performance of intellectual potential cannot be expressed by these parameters. As I see it, VAIC™ is the most promising one for now.

2. It is based on totally objective figures in order to be calculated. All the figures - output, input, value added, physical capital and intellectual potential - are derived from the market. It can be precisely calculated so it can be followed daily which is also fundamental for a new measuring system.

3. Due to its informational capacity the system is almost inevitable when important business decisions have to be made:
   - Achieves better efficiency of physical capital and intellectual potential
   - All the activities of the companies are involved in a unique way: performance of the employees, inside organization and client relationships
   - Business activities inside a company are viewed and weak spots or inefficient spots are located
   - Offers a warning if inadequate business results are achieved
   - VACA, VAIP, VAIC™ coefficients can be calculated for each business unit and for the company as a whole, which gives an objective comparison with the competitors

And finally only by applying the VAIC™ method it was possible to carry out this overall analysis of two economies. Here are the most important conclusions:

- Intellectual potential efficiency can be measured and therefore also managed

- The dependence between IP and VA is very strong

- IP has proved to be the decisive resource for corporate success which is completely in accordance with knowledge-based economy

- Increasing efficiency of the IP is the easiest and cheapest way to achieve long time business success

- Considering the fact that companies are spending more money on IP than on physical capital, this analysis has shown how important information on the performance of IP is. It should therefore receive more attention in the future.

Thanks to the possibility of measuring the performance of intellectual potential we have achieved what is most important for knowledge based economy: we have precisely and objectively determined how efficiently IP creates value.
Drucker P.: The Future That Has Already Happened, HBR, 9-10/1997, s. 20


Edvinsson:


Sveiby K.E.: p. 171

Edvinsson: p 186

Edvinsson: p.188


Drucker P.: The Future That Has Already Happened, HBR 9-10/97, s. 22