

## **Quantitative Evaluation of the Impact of Novartis Knowledge Center Information Services in Drug Discovery and Development**

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**Abstract:** Novartis Knowledge Center's (NKC) VALUE (Value Assessment on Library Utilization Efficiency) initiative was created to determine the value of its information services (via its e-library model) in supporting the Novartis mission of bringing innovative drugs to patients and its business drivers for innovation, growth and productivity. To evaluate the business impact and outcomes of NKC's delivered information services on drug discovery, drug development and marketing at Novartis, NKC enterprise-wide customer satisfaction surveys were conducted in 2008 and 2011. Using the survey data, we examined service relevancy (how NKC services align to Novartis overall strategies and top objectives), efficiency (how quickly and easily NKC customers obtain information relevant to their decision making), and the return on Novartis investment in the NKC. The 2011 survey data results validated that NKC is on track in executing its e-library model strategies, but caution on keeping up with the growing user population.

**Keywords:** Outcome based performance, business impact, service relevancy, service efficiency, ROI

### **Introduction**

Novartis was formed in 1996 by the merger of two large Swiss firms, Sandoz and Ciba-Geigy, both headquartered in Basel, Switzerland with large operations in New Jersey, USA. Since its creation, Novartis has responded to the challenges of a competitive environment by transforming itself into a global company. Before the acquisition of Alcon in April 2011 and execution of our surveys, Novartis had 100,000 employees in 140 countries and offered a wide range of healthcare products through the Pharmaceutical, Vaccine and Diagnostics, Sandoz (generics), and Consumer Health sectors.

The NKC is the only library and information service hub in the global Novartis community with staff based in Switzerland, the US, the UK, and China. Novartis Associates can access e-library services 24 hours a day, 7 days a week

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from anywhere in the world. The collection consists of scientific, technical, medical and business electronic journals (3000+), e-books (4000+) and databases (nearly 200) delivered via the library portal.

As an information service organization in a for-profit company, NKC contributes to Novartis competitive advantage by providing fast and easy access to relevant, targeted information that supports decision-making. NKC's enterprise e-library business model was established in 2006 to achieve the goal of enabling decisions that support the Novartis mission of bringing innovative medicines to patients to prevent and cure diseases, to ease suffering, and to enhance quality of life (Chaudhuri, He, and Juterbock, 2010). NKC's VALUE project was introduced (He, Chaudhuri, and Juterbock, 2009) (He, Chaudhuri, and Juterbock, 2011) along with the NKC critical success factors (CSFs) (He, Chaudhuri, and Juterbock, 2011) to gauge the e-library model's success.

### **Methodology**

We hypothesize that NKC contributes to Novartis success in achieving its mission and achieves a strong return on the company's investment through its information services. The CSFs along with Key Performance Indicators (KPIs) have been studied across all Novartis sectors and their primary business functions via multiple projects in VALUE. This paper focuses on the core quantitative KPIs on the three CSFs including: (1) service relevancy, (2) service efficiency, and (3) return on investment (ROI) as evaluated by data derived from customer satisfaction surveys conducted in 2008 and 2011. Both identical surveys (designed with Outsell, Inc.) included specific questions aimed to study NKC business impact at the overall enterprise level, individual sector level, and primary business function/discipline level. For this paper, the focus is on results related to NKC impact on the enterprise level (see appendix for the detailed business impact related survey questions).

Critical Success Factors assessed by survey:

1. NKC service relevancy: The survey asked several questions about what types of business impact were supported by interactions with the NKC, such as to 'help stimulate ideas for innovation or avoid reinventing the wheel', 'manage regulatory compliance issues', 'drug safety evaluations', 'support the uptake of launched products', and 'improve manufacturing yield'. Other questions asked whether 'using NKC helped save time', 'using NKC helped save money' or 'using NKC helped generate revenue'. The responses from these questions and resulting data correspond to the Company's defined CSFs concerning innovation, productivity and growth for its patient/customer-centric strategy.

2. NKC service efficiency: A set of questions assessed how NKC leverages its technology for the fastest possible delivery of relevant information to targeted user populations to support sound decision making. One KPI is the growth of the NKC user community size (at constant budget), which would indicate an increase of efficiency on a per capita level. Another KPI is NKC user

information-seeking efficiency, which is the average weekly hours spent on gathering information using NKC resources. Results from survey questions to assess these KPIs were benchmarked against industry peers.

3. Return on investment for the total value of NKC services provided.

Figure 1 defines the relationship among these 3 factors at the concept level.

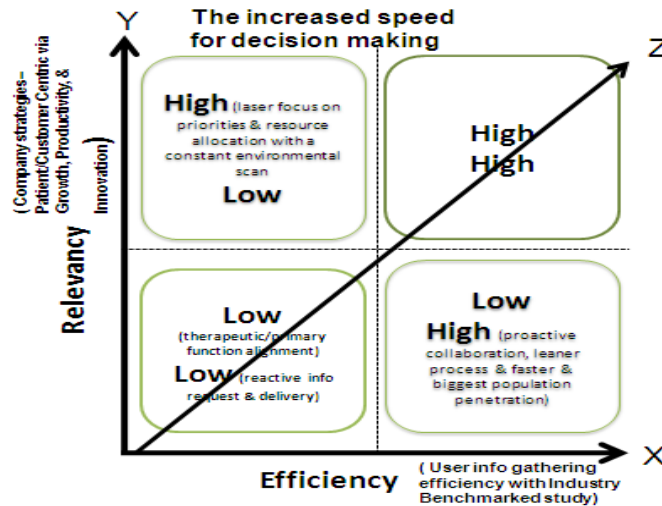


Figure 1. NKC information service performance quadrants X, Y, and Z are the 3 CSFs in terms of levels of business impact to the company and its users. The four quadrants are the internal process managements with summary attributes. XYZ’s outcomes and the outputs are dependent on all the internal resource alignment to the company’s strategy and information discovery and delivery processes.

To achieve the optimal service value (Z), NKC must maximize relevancy (Y) and efficiency (X) of the services it provides.

**Key findings and discussions**

**Analyses of the 2008 and 2011 survey data**

Both surveys covered a sufficient representation of the Novartis user population across 6 sectors and 8 primary business functions from 96 countries and regions in the world (Table 1.)

	Number of surveys sent	Responses received	Response rate%	Confidence level%
2008	19,000	4,769	27	95 ± 1.2
2011	38,000	6,295	18	95 ± 1.1

Table 1. Survey responses from total of 6 sectors and 8 primary functions, 2008 v. 2011

**NKC Service Relevancy**

NKC remains cognizant of the pharma external challenging environment and adapts its information services proactively to change within the major user communities (e.g. addition of new therapeutic areas to the Novartis portfolio) and to match the company's top priorities of innovation, productivity and growth. These adaptations impact information consultancy, learning and training, globally licensed electronic databases, e-journals, e-books, and document ordering services. The tables below summarize survey respondents' assessments of how NKC helped them achieve these top priorities.

**1. Growth**

	Develop a market assessment for new products/indications %	Uptake of launched products %	Bring new or improved products to market %
<b>2008</b>	<b>24</b> ( 530/2,168)	<b>19</b> (412/2,168)	<b>N/A</b>
<b>2011</b>	<b>12</b> ( 569/4,739)	<b>13</b> (616/4,739)	<b>11</b> (521/4,739)

**Table 2. Comparison on Growth 2008 v. 2011**

The impacted populations are bigger in each case in 2011, but the percentage decline from 2008 to 2011 in the first two impacts suggests that NKC must respond appropriately to ensure growth of the user population.

**2. Productivity**

	Saved me time %	Helped me save money %	Change/improve an operational process to reduce cost & increase efficiency (%)	Improve manufacturing yield %
<b>2008</b>	<b>66</b> (3,147/4,769)	<b>37</b> (1,764/4,769)	<b>15</b> (325/2,168)	<b>N/A</b>
<b>2011</b>	<b>71</b> (3,361/4,734)	<b>35</b> (1,657/4,734)	<b>13</b> (616/4,739)	<b>4</b> (190/4,739)

**Table 3. Comparison on Productivity, 2008 v. 2011**

Survey responses for NKC "Saved me time" increased and "Helped me save money" decreased from 2008 to 2011. The survey response for NKC helped "Change/improve an operational process to reduce cost & increase efficiency" increased from 2008 to 2011 in terms of impacted population (616 vs. 325). Full survey questions on 'Business Impact' are reproduced in the Appendix.

These results suggest that NKC services contribute to Novartis growth and productivity. Internally, NKC has shown productivity by operating on a flat budget over these three years yet delivering services to more users. Additional research is needed to assess why "Help me save money" decreased.

### 3. Innovation

When asked to rank business impact derived from using NKC, the most frequent response was to ‘help stimulate ideas for innovation or avoid reinventing the wheel’, 1,896/4,739 (40%), 2011 (not asked in the 2008 survey).

**4. The business impact types vary according to the business/discipline functions** (see table 4, higher percentages are **Bold**). For example, the impact type of “Help stimulate ideas for innovation or avoid reinventing the wheel” received higher responses from respondents in Chemistry and Biology areas as these two disciplines are involved in drug target discovery. Technical Operations is another function where innovation is critical for the enhancement of productivity, and respondents from this group also scored higher on this impact type.

The impact types of “Manage regulatory/compliance issues” and “Drug safety evaluations” received higher scores from respondents in Preclinical, Clinical and Regulatory fields as their work is heavily regulated by healthcare authorities.

	DISCIPLINE / FUNCTION								
	Total	Chem	Biol	Preclin	Clinical	Regul	Tech	Tech	Sales
<b>Bases:</b>	4,739	396	494	157	1168	364	303	355	810
	%	%	%	%	%	%	%	%	%
Help stimulate ideas for innovation or avoid "reinventing the wheel"	40	<b>60</b>	<b>65</b>	48	35	23	<b>60</b>	30	35
Keep me updated to adjust objective /project as needed	39	35	<b>48</b>	<b>44</b>	<b>43</b>	28	39	33	34
Manage regulatory/compliance issues	21	12	6	25	28	<b>60</b>	24	24	11
Drug safety evaluations	21	15	12	<b>47</b>	<b>33</b>	<b>48</b>	17	10	18
Improve quality control/assurance	17	22	11	15	22	17	<b>29</b>	<b>35</b>	6
Make project or candidate selections	13	<b>19</b>	<b>30</b>	<b>22</b>	10	4	14	6	9
Uptake of launched products	13	1	2	4	<b>20</b>	9	5	6	<b>26</b>
Change/improve an operational process or reduce costs and increase efficiencies	13	17	15	11	10	10	<b>21</b>	<b>23</b>	8
Develop a market assessment for Novartis products/new indications	12	2	4	4	<b>15</b>	10	6	2	<b>28</b>
Bring new or improved products to market	11	8	8	9	<b>17</b>	7	<b>16</b>	4	<b>16</b>
Pursue a patent	8	<b>34</b>	11	3	2	2	16	3	4
Help recruit/retain customers/patients	7	1	2		13	3	2	2	13
Speed up the production process	7	14	8	3	5	3	<b>13</b>	<b>15</b>	3
Pursue a licensing/a deal negotiating/ technology acquisition	5	4	6	8	3	4	5	2	6
Improve manufacturing yield	4	12	5	1	1	2	<b>12</b>	<b>15</b>	1
Obtained information, answered questions	2	1	3	1	2	2	2	1	1
Not at all/none/no distinct advantage	2	1	3	1	1	1	2	4	2

**Table 4. Types of business impact with NKC support across business functions/disciplines**

### NKC Service Efficiency

NKC works to constantly increase efficiency by leveraging technology to present a user-friendly knowledge portal, expose and repurpose relevant content, implement full-text linking in popular databases, improve search capabilities for finding relevant sources and information, automate news alerting services, and utilize tools to manage knowledge. Efficiency is measured by the NKC customer user community size and 'NKC users' information seeking efficiency.

**1. NKC user community response size in 2011** has grown by 31% since 2008 (6,295 vs. 4,769). These people use information in support of their jobs. This indicates that NKC could have increased the size of the use population with a lower per capita cost.

**2. NKC User information-seeking efficiency** is significantly better than the Industry Benchmark in terms of "Gathering information for their jobs" ( $P < 0.01$ ), a similar result as that obtained in 2008.

		Mean hours (x)	SD	N	P value	P value NKC 2008 vs. NKC 2011
2008	NKC	4	4	3,557	<0.01	>0.05
	Industry Benchmark*	5.8	5.5	485		
2011	NKC	4	4.8	4,806	<0.01	
	Industry Benchmark*	4.8	4.9	1,780		

**Table 5. Information gathering efficiency benchmarked for 2008 and 2011**

\* Outsell's Information Management Benchmark Database © 2011 Outsell, Inc. All rights reserved. Reprinted with permission.

These results indicate that NKC users are faster at gathering needed information for their decision making than their industry peers.

### Total Return On Investment (Table 6)

Considering today's economic climate, it is essential to continually evaluate resources and services and their overall ROI for the NKC user community. We propose that two components are considered to measure ROI:

**1. The total annual budget** (personnel, occupancy, technology and content licenses) is the company's investment on NKC information services for the user community.

**2. The total equivalent dollar value that NKC produces** is the sum of NKC User Market Value plus the Saving Value gained from the users' information seeking efficiency

The calculation formula is  $ROI = \frac{\{[(Market\ Value + Saving\ Value) - total\ investment\ on\ NKC]\}}{total\ investment\ on\ NKC} \times 100\%$   
 (For the detailed calculation, see the reference on He, L., Chaudhuri, B. and Juterbock, D. (2011) “Value Creation, Assessment, and Communication in a Corporate Library”. *Best Practices for Corporate Libraries*)

	2008	2011
NKC Market value (\$)	\$79,950,000	\$127,050,000
Saving value from being efficiency (\$)	\$3,690,000	\$21,750,000
Total investment on NKC	X1*	X2*
ROI	1/3.4	1/4.6

**Table 6. Comparison ROI, 2008 v. 2011.** Cost per FTE=\$150,000, the average total industry compensation of R&D and Commercial associates.

\* These figures are confidential

The ROI derived from 2011 survey is 1: 4.6, which means that with a one dollar investment, Novartis gets a return of 4.6 dollars. Compared to 2008, ROI increased 1.2 dollars more in 2011 for each dollar the company invested.

### Conclusions

The 2008 survey data established a baseline to measure the success of NKC’s e-library business model on its objectives. The 2011 survey data results validated and confirmed that NKC is on track in executing its e-library model strategies (Chaudhuri, B., He, L. and Juterbock, D. ,2010), but caution that NKC must pay attention to delivering a higher level of service to a larger (31%) user population. Specific points include:

1. NKC services are relevant to Novartis businesses by contributing to the company’s major CSFs of innovation, growth and productivity.
2. NKC produced more business value to its user community and achieved a more efficient per user per capita with the 31% growth of the user market in 2011 (with the same budget) compared to that in 2008.
3. NKC services were significantly more efficient in ‘information gathering’ ( $p < 0.01$ ) than the Industry Benchmark in both the 2008 and 2011. Thus, users are able to access needed information faster for their decision making needs in this competitive environment.
4. Overall, NKC delivered an increased ROI (from 1: 3.4 to 1: 4.6) for its user community between 2008 and 2011 based on our experimental assumptions.
5. NKC must investigate the cause of decrease among several types of impacts (despite increase in size) to ensure that services remain on track with the user base growth.

It is imperative that NKC stay focused on the Novartis mission when implementing strategies to provide relevant and timely information to help bring

innovative drugs to patients. NKC can achieve their objectives by continuing to optimize the relevance and efficiency of its information services, resulting in realization of a greater ROI. How we represent this increased ROI through satisfaction and effectiveness of our user community will be explored further to improve our interpretation of value.

## References

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## Appendix

Survey questions around 'Business Impact', extracted from the overall survey.

1. Thinking about the instances when you used NKC in the past 12 months, what impact would you say using NKC has had on your job? Would you say that . . .			
	Yes	No	Don't Know
a. Using NKC has saved me time	1	2	-9
b. Using NKC has helped me make money (e.g., by providing information that led to launching a new product or supporting a sale)			
c. Using NKC has helped me save money (e.g., by helping you reduce an operational expense)			

2. In your experience over the past year, what types of business impact did your interactions with the Novartis Knowledge Center support? <i>Please select all that apply</i>	



Help stimulate ideas for innovation or avoid “reinventing the wheel”	1
Pursue a patent	2
Make project or candidate selections	3
Manage regulatory/compliance issues	4
Drug safety evaluations	5
Help recruit/retain customers/patients	6
Improve quality control/assurance	7
Pursue a licensing/a deal negotiating/ technology acquisition	8
Develop a market assessment for Novartis products/new indications	9
Uptake of launched products	10
Change/improve an operational process or reduce costs and increase efficiencies	11
Improve manufacturing yield	12
Speed up the production process	13
Keep me updated to adjust objective /project as needed	14
Bring new or improved products to market	15
OTHER, PLEASE SPECIFY: _____	99

<b>3. On average, about how many hours do you spend each week obtaining, reviewing and analyzing information to assist you in your job?</b>	
Hours each week	OT
Don't know	-9
<b>And how do those hours break out across the following:</b>	
Gathering, looking for or pulling the information together	Hours
Analyzing and applying the information	Hours

<b>4. On average, in the past 12 months how often have you used the Novartis Knowledge Center (NKC) to help you obtain information? <i>Please select only one response</i></b>	
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<b>Daily</b>	<b>1</b>
<b>Several times a week</b>	<b>2</b>
<b>Once a week</b>	<b>3</b>
<b>Several times a month</b>	<b>4</b>
<b>Once a month</b>	<b>5</b>
<b>Less than once a month</b>	<b>6</b>
<b>Haven't used in past 12 months</b>	<b>7</b>