CHAPTER 4

THE ESTABLISHMENT OF THE TRADE- OFF BETWEEN THE COMPLEXITY OF THE SOFTWARE AND ITS DELIVERABILITY BY THE EVOLUTIONARY MULTI-OBJECTIVE OPTIMIZATION

The situations that are conflicting in nature with each other in terms of their goals can be very well represented by the evolutionary multi-objective optimization. The solutions that are generated are called Pareto-optimal solutions. Here, there are have two conflicting situations: software complexity and deliverability.

In this particular case there is a need for maximizing the deliverability aspect of the software as well as the Simplicity factor of the software which is represented by $g(x) = (d(x), s(x))$.The multi-objective formulation of complexity and usability can be given as:

$$Maximize \{f_3(d), f_4(u)\}$$

$$Minimize \{f_1(c), f_2(p)\}$$

Equation 8

Where f_1 (c) is the complexity function of the software.

f_2 (p) is the poor usability function of the software.

f_3 (d) is the deliverability function of the software.

f_4 (u) is the usability function of the software.

4.1 COMPLEXITY AND DELIVERABILITY ANALYSIS USING THE REAL DATA [ANNEXURE A]

Table 4.1: A snapshot of data generated after applying complexity and deliverability metrics

Bank – A		Bank – B		Bank – C	
CS-1	DLS-1	CS-2	DLS-2	CS-3	DLS-3
31	81	61	39	85	28
34	76	71	36	92	25
43	71	76	31	95	20
44	63	81	28	101	21
41	61	91	24	106	19

Where,

CS – Complexity of Software

DLS – Deliverability of Software

A set of software and two set of questionnaires [Annexure 2, 3] has been developed for private and government financial institutions with varying range of

complexity level. The software's complexity level has been performed by the process of complexity analysis. This particular software application has been used by three individual banks in the city named Lucknow.

The data has been collected from the employees after filling the questionnaires over a period of time which is basically the ratings the experiences that they faced during working on that software and then this data has been feed or entered into the JAVA based open tool known as 'GUAJE' which works on the basics of EMO and the results that are generated are promising.

After analysis the results obtained from the tool it is concluded that software with higher usability factor or lower complexity level are much popular among the user which results into the higher acceptability of that particular software.

4.2 RESULTS OBTAINED FROM EMO FRAMEWORK (GUAJE)

This tool GUAJE implements the methodology of fuzzy modelling called Highly Interpretable Linguistic Knowledge (HILK) that is focused on yielding a high-quality interpretability-accuracy trade-off thanks to combining expert and induced knowledge in a common framework.

This tool contains a computational environment for creating interpretable as well as accurate fuzzy systems through integrating several pre-existing open source tools, taking profit from the major advantages of each individual tool by analogy with the major idea primary to Soft Computing. In reality, it is an upgraded version of the free software known as KBCT (Knowledge Base Configuration Tool).

On applying the data on this tool, following results have been carried out.

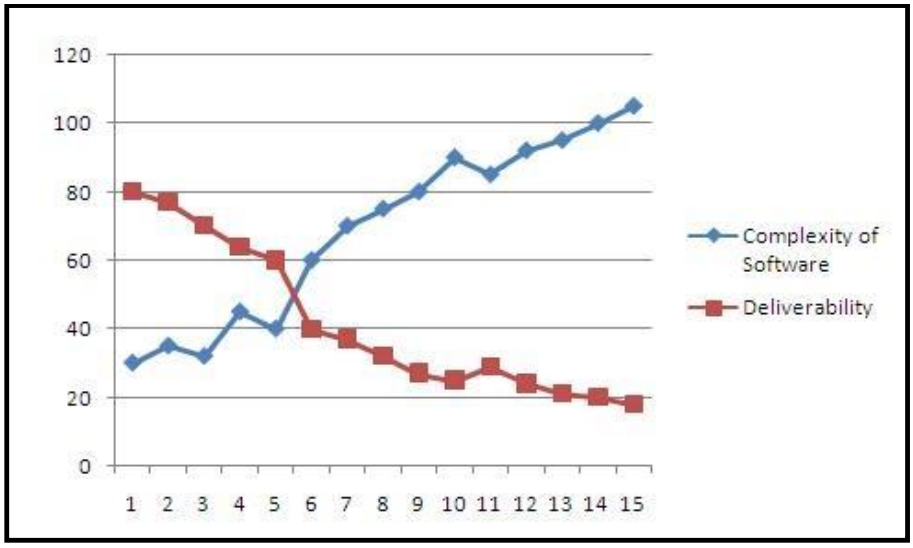

Figure 4.1: Complexity v/s deliverability

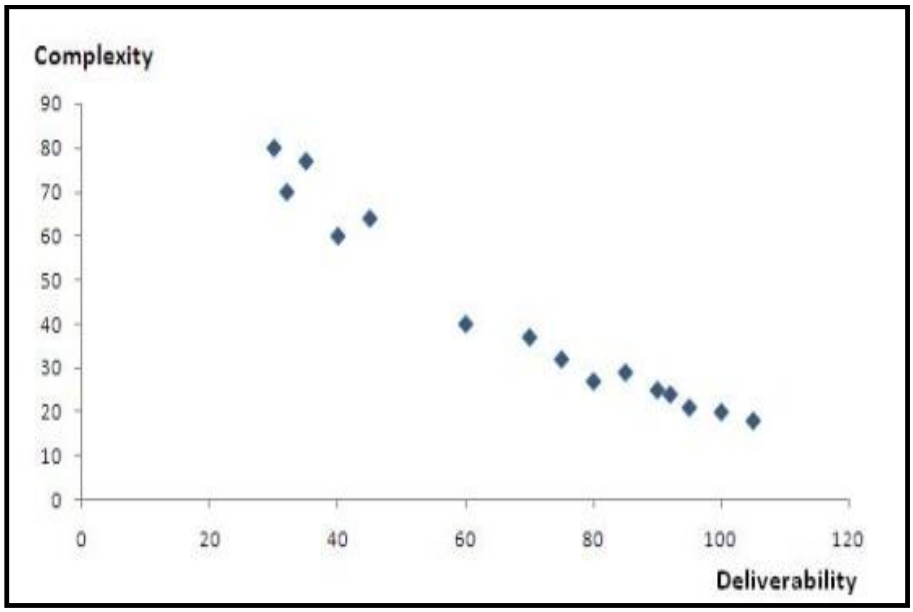

Figure 4.2: The Pareto Front (deliverability and complexity)

4.3 CONCLUSION

The plot between complexity and deliverability shows that deliverability of the software drops significantly with the rise in the complexity of the software. After analysis the results obtained from the tool it is concluded that software with higher usability factor or lower complexity level are much popular among the user which results into the higher acceptability of that particular software.