# How Business Intelligence Can Help You to Better Understand Your Customers

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## ABSTRACT

Companies can incur heavy losses when customers do not return; therefore, they need to have a better understanding of their customers' behaviors in order to improve service and products. And nowadays, there are multiple resources of customers' data especially with web services, such as websites, chatbots, emails, social media, PoS, ERP, CRM, SCM, therefore, it becomes difficult to collect all this huge data altogether and analyze it manually This paper highlights the role of business intelligence in improving the relationship with the customers, and explores the techniques used to analyze customers' data in order to predict their demands and reach their satisfaction.

## KEYWORDS

Business Performance Management, CRM, Customer Retention, Data Mining, Data Warehouse, ETL, OLAM, OLAP

## INTRODUCTION

The market is growing rapidly and the data becomes huge and from multiple resources, which means that the demand for user-friendly analytics tools is growing too. From here, the need for business intelligence systems arises to help make sense of the organizational data. This paper should help identifying the role of BI in customer relationship management and how it becomes vital to use such intelligent tools in the crazily growing data age.

Business intelligence (BI) is the use of computing technologies (applications and software) to collect business data from multiple resources and analyze it then transform it into useful insights that help managers and owners to take the right actions in order to improve the business performance and meet the goals required to business success. The need for BI emerged in the latter part of the 20th century and it has become an integral aspect of the decision making processes.

Business Intelligence can help the company in understanding its customers in order to improve its relationship with them, such as faster conversion of potential into actual clients, reducing the number of outgoing customers and increase sales to existing customers, and that in its turn will increase sales and revenue (Habul & Pilav-Velic, 2010). This paper will discuss some of the techniques BI uses in improving the relationship with customers, but first, it will explain the concept of BI system and the role of each component.

Figure 1 shows a conceptual model of Business Intelligence in e-business, this mode defines e-business as implementation of any electronic transaction-related activities from enterprise external environment, including Customer Relationship Management (CRM), Enterprise Resource Planning (ERP), Supply Chain Management (SCM), Point of Sale (Pos), and so on. After the data is gathered from the web store and stored in a central database, business intelligence converts the data into

information and knowledge that can be used for enterprise decision-making. Technologies used include extraction, transformation and load (ETL), data warehousing, data mining and data analysis. The results provide an overall view of e-business data flow patterns in visualized form such as dashboards, reports, graphs, alerts and so on. The technologies used in business intelligence are further described in the next section (Sheng Hooi, 2012).

## ARCHITECTURE OF BI

Business Intelligence has four components: a data warehouse and its source data, business analytics – a collection of tools for manipulating, mining and analyzing data, business performance management (BPM) tools for monitoring and analyzing performance, and a user interface (Sheng Hooi, 2012).

### Data Warehouse

A data warehouse is a centralized data repository that collects and manages data derived from operational systems (such as ERP, CRM, PoS, marketing and sales) and external data sources (such as Online Social Networks, Blogs, Videos, E-mails, Text Documents, Chat). ETL (extraction, transformation and loading) tools are used to perform the process of extracting data from multiple source systems, cleansing and transforming, then loading the data into the data warehouse in a standard and consistent format which is structured for query and analysis. A data warehouse is designed to help decision makers to take the right decisions by consolidating and analyzing data and creating reports at different levels.

### Business Analytics

Business analytics also known as analytical processing is a broad category of applications and techniques for gathering, sorting and analyzing data to help enterprise users make better business and strategic decisions. For example, OLAP (online analytical processing) which helps to analyze the multi-dimensional data from various angles for using them in business reporting, trends analysis, sales forecasting and other planning purposes, Ad hoc reporting, which is the process of creating reports on the fly by business end-users (no need for technical skills), displaying information in a table or a chart that is the result of a question which has not already been codified in a production report. Data Mining is another set of analytical techniques that helps to get the patterns from large data sets and converting it into understandable form to be used by other BI components (Sheng, 2012). Online Analytical Mining (OLAM): is an architecture that integrates OLAP and data mining, it helps user to select a set of data and analyze it using data mining algorithms (Ritbumroong, 2015).

The first aspect of customer data analysis is "customer knowledge," implying awareness of key customer characteristics that are relevant to your organization's business processes most likely from customer profile. Examples of related data are demographic characteristics (basic personal information, including age, gender, income, marital state, religion, family size, occupation and education), geographic characteristics (such as where the individual lives, whether the individual is married), analytical characteristics such as purchasing patterns or credit worthiness, frequency of purchase, time of high purchase) and psychographic characteristics (such as interests, personality, attitude, culture) (Gillespie, n.d.).

Customer data segmentation is an important analytical process that helps marketers to segment market based on consumer personality traits, lifestyle, social class, location, and so on. Some of the benefits of segmentation are:

- Identify the most and least profitable customers
- Focus the marketing on the customers who will be most likely to buy company's products or services

Figure 1. Conceptual model of business intelligence in e-business (Ranjan, 2012)
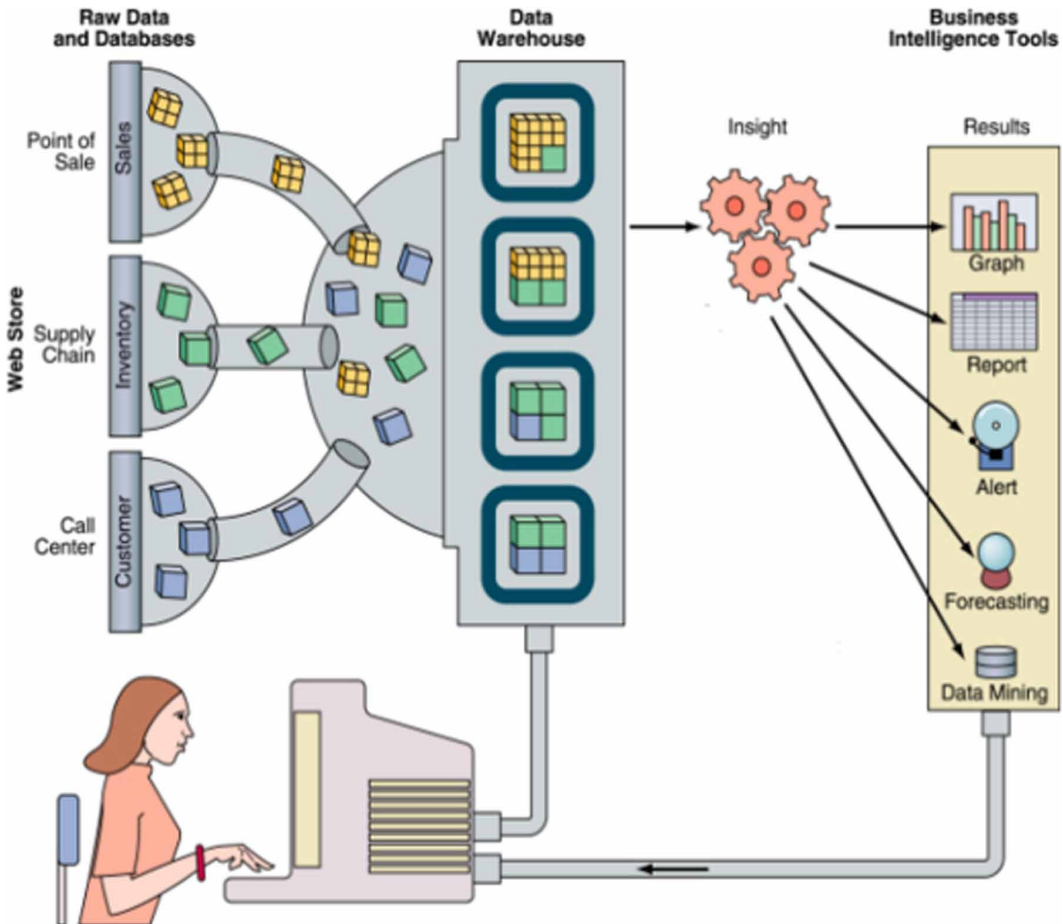


- Avoid the markets which will not be profitable for the company
- Build loyal relationships with customers by improving customer service and products to meet customer needs
- Get ahead of the competition in specific parts of the market
- Use company's resources wisely
- Identify new products by predicting customer demands (Gillespie, n.d.).

Segments need to be identified according to business goals, for example, if the goal is for attracting users to buy a product or service, one segment could be for those who have completed a purchase transaction. Second could be for those who haven't made a purchase. A third could be for the ones who have frequently purchased.

Other examples of customer data segmentation are:

New and returning users, Paid subscription vs. free members, females aged < 45 vs. females aged > 45, and so on (Gillespie, n.d.).

After that, companies can target their marketing efforts and campaigns to the most profitable consumers, for example, an Islamic clothing company will target their products and services to Muslim females aged > 20 and who are interested in modest fashion. A fast food company will target their marketing offers to teenagers and to employees (Gillespie, n.d.).

A successful data mining implementation including customer segmentation should follow specific planned steps as follows:

- Business Understanding: the implementation of data mining project should start with understanding of the business objective (which should be identified as a data mining target), and an assessment of the current situation and also problems. Success criteria should be defined and a project plan should be developed (Ziafat & Shakeri, 2014).
- Data understanding and preparation: This phase also includes initial data collection and exploration with summary statistics and visualization tools to understand the data and identify potential problems in availability and quality.

The data to be used for segmentation should be identified, selected, and prepared for inclusion in the segmentation modeling. This phase involves the collection, cleaning, integration, and formatting of the customer data according to the needs of the project (Ziafat & Shakeri, 2014).

- Modeling: This phase includes the Identification of the segments with cluster modeling. Analysts should select the appropriate modeling technique for the particular business objective. Based on cluster analysis, customers are grouped into different groups (segments). Particularly, customers can be segmented according to their value, socio-demographic and life-stage information, and their behavioral, need/attitudinal, and loyalty characteristics. The type of segmentation used depends on the specific business objective (Ziafat & Shakeri, 2014).

The prepared datasets are then used for model training. This phase involves the examination of alternative modeling algorithms and parameter settings and a comparison of their fit and performance in order to find the one that yields the best results, and the model settings can be revised and fine-tuned as needed (Ziafat & Shakeri, 2014).

- Evaluation: The generated models are then formally evaluated not only in terms of technical measures but also, more importantly, in the context of the business success criteria set out in the business understanding phase. The segmentation scheme that best addresses the needs of the organization is selected for deployment (Ziafat & Shakeri, 2014).
- Deployment: The project's findings and conclusions are summarized in a report, and the customers and segments are scored, then the segmentation results should get distributed throughout the enterprise and incorporated in the organization's databases and operational CRM system, and will be used in developing differentiated marketing strategies and segmented marketing.

Finally, a maintenance plan should be designed and the whole process should be reviewed (Ziafat & Shakeri, 2014).

## Business Performance Management

A Business Performance Management (BPM) system used to monitor and control the performance of an organization, and alerts managers to potential opportunities, impending problems, and threats, and then empowers them to react and take the right decisions in order to achieve business goals. Key performance indicators (KPI) are used for this purpose. These KPIs include revenue, return on investment, overhead and operational costs (Sheng Hooi, 2012).

Some examples of KPIs that should be tracked to measure customer's retention are:

*Repeat Customer Rate*, this is calculated by dividing total re peat customers (who purchased at least 2 times) by total customers (who purchased at least once).

*Average Order Value*, this is calculated by dividing total revenue by total number of orders.
*Customer Retention Rates (CRR)*, you need the following information to calculate customer retention:

- Number of customerS at the end of a time period (E)
- Number of new customers during that period (N)
- Number of customers at the start of that period (S)

The equation is: *CRR= ((E-N)/S)\*100* (Winsauer, *2018*).

Today, every organization has huge data of their customers, including billing information, customer transactions, website hits, and so on. The organization can use data mining and analysis in order to define a probability score for each customer. This probability score reflects how likely the customer switches the vendors. Then, then the organization gives the customers with higher risk more personalized attention (Agrawal, 2018).

Another KPI should be considered for customer retention purpose is customer lifetime value (CLV); it represents the total amount of money a customer is expected to spend in your business, or on your products, during their lifetime. This is an important figure to know because it helps you make decisions about how much money to invest in acquiring new customers and retaining existing ones. Knowing CLV can answer important questions as:

- How much you can spend to acquire a similar customer and still have a profitable relationship.
- What kinds of products customers with the highest CLV want.
- Which products have the highest profitability.
- Who your most profitable types of clients are (Winsauer, 2018).

## User Interface

There are multiple visualization and reporting tools used in BI system, dashboard is one of them, a business intelligence dashboard is an information management tool that is used to track KPIs, metrics, and other key data points relevant to a business, department, or specific process, it provides preconfigured or customer defined metrics, statistics, insights and visualization into current data Through the use of data visualizations, dashboards simplify complex data sets to provide users with at a glance awareness of current performance (Sheng Hooi, 2012). Figure 2 shows an example of BI dashboard for customer profitability.

While Dashboard is a high-level day-to-day view of main KPIs of business on a single page based on one or more datasets, it is considered a navigation point to one or more detailed reports. BI Report is a combination of multiple visual elements (charts, texts, values…) based on one dataset and can have multiple pages. In BI Report, user can hover, highlight, slice and dice, drill down through multiple levels or choose a column in a chart and check its relationships with other visualizations.

Figure 3 shows a report example for top customer sales.

## MEASURE FOR GREATER SATISFACTION

After the company has put its customer data to use and has altered its business tactics, it should assess the success of its improved strategy. Measure fulfillment rates and delivery times to find out how likely are the customers to purchase again. The company can use these measurement metrics to implement or alter its strategies for better customer satisfaction, resulting in high customer retention rates (Nielsen, 2017).

**Figure 2. Customer profitability dashboard sample for power BI (Microsoft Power BI, 2019)**
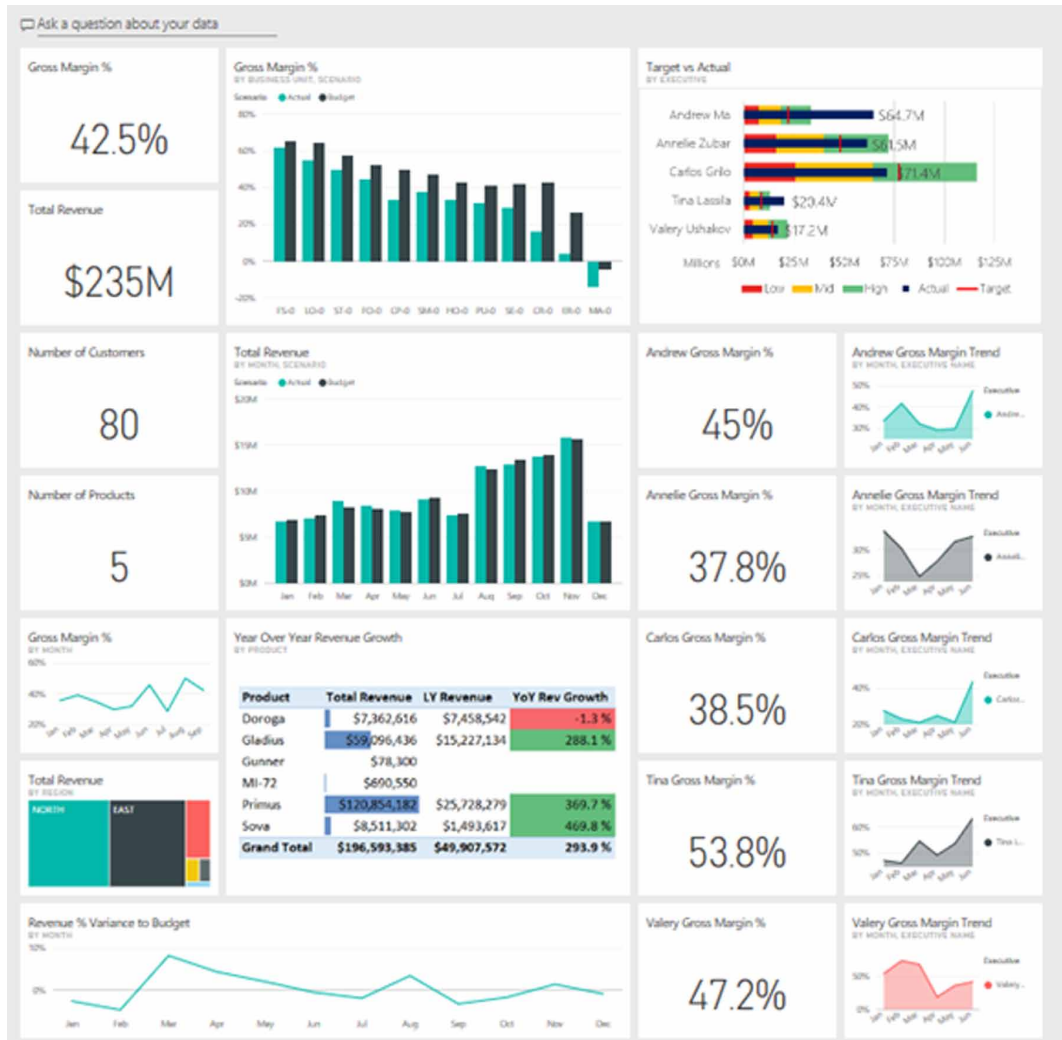


## INFLUENCE CUSTOMER BEHAVIOR

Business Intelligence software takes the marketing game a step forward by providing the ability to influence customer behavior and the market. When you can monitor, analyze and measure customer response, you can allocate your marketing budgets to the practices with the highest impact. For example, if you already know that customers are reacting well to one of your marketing campaigns, say- a free service that you are offering, you can capitalize on this information by either offering more free services in different products, or come up with other similar plans. This will influence your customers to keep doing business with you and strengthen your relationship, resulting in better retention (Nielsen, 2017).

**Figure 3. Top 20 customer report (JetGlobal, n.d.)**



| No. | Name | Salesperson Name | % of Total Sales | Month-to-Date Sales | LY Sales | Variance | Quarter-to-Date Sales | LY Sales | Variance | Year-to-Date Sales | LY Sales | Variance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C100064 | Möbel Siegfried | Peter Saddow | 5% | 30,791 | 24,593 | 25% | 93,506 | 89,186 | 5% | 170,381 | 109,933 | 55% |
| C100099 | Voltive Systems | Linda Martin | 5% | 14,276 | 16,235 | (12%) | 93,024 | 68,308 | 36% | 169,087 | 123,052 | 37% |
| C100138 | Dantons | Annette Hill | 4% | 33,431 | 15,434 | 117% | 103,212 | 35,665 | 189% | 163,293 | 56,723 | 188% |
| C100059 | Meersen Meubelen | Peter Saddow | 4% | 36,287 | 33,143 | 9% | 108,849 | 79,437 | 37% | 160,896 | 112,954 | 42% |
| C100086 | Top Action Sports | Bart Duncan | 4% | 35,185 | 14,347 | 145% | 108,422 | 27,331 | 297% | 158,479 | 58,623 | 170% |
| C100145 | Dicon Industries | Annette Hill | 3% | 19,036 | 21,519 | (12%) | 60,847 | 57,709 | 5% | 122,531 | 76,176 | 61% |
| C100050 | Lauritzen Kontormøbler A/S | Peter Saddow | 3% | - | 16,248 | (100%) | 32,116 | 45,112 | (29%) | 114,768 | 104,859 | 9% |
| C100035 | First Touch Marketing | Annette Hill | 3% | - | - | 0% | 40,926 | 33,399 | 23% | 98,059 | 33,399 | 194% |
| C100116 | Sumtones, AG | Peter Saddow | 2% | 15,554 | 13,268 | 17% | 58,794 | 15,153 | 288% | 89,502 | 31,071 | 188% |
| C100029 | Elkhorn Airport | Bart Duncan | 2% | 35,184 | 14,386 | 145% | 39,062 | 42,491 | (8%) | 84,917 | 54,874 | 55% |
| C100040 | Guildford Water Department | Bart Duncan | 2% | 4,838 | 14,387 | (66%) | 35,380 | 29,115 | 22% | 81,233 | 53,649 | 51% |
| C100088 | Triton Industries | Linda Martin | 2% | 17,309 | - | 0% | 46,319 | 34,882 | 33% | 75,234 | 50,219 | 50% |
| C100031 | Englunds Kontorsmöbler AB | Peter Saddow | 2% | 14,052 | - | 0% | 43,504 | 20,201 | 115% | 73,658 | 24,472 | 201% |
| C100060 | MEMA Ljubljana d.o.o. | Peter Saddow | 2% | (28) | 20,187 | (100%) | 29,434 | 84,827 | (65%) | 63,306 | 105,407 | (40%) |
| C100104 | DenoTech | Annette Hill | 2% | 43,353 | (32) | (137032%) | 43,353 | 18,734 | 131% | 62,438 | 37,176 | 68% |
| C100083 | Stanfords | Linda Martin | 2% | - | 29,489 | (100%) | 25,048 | 115,344 | (78%) | 61,325 | 186,752 | (67%) |
| C100076 | Showmasters | Linda Martin | 2% | 25,366 | - | 0% | 48,196 | 14,123 | 241% | 59,509 | 56,095 | 6% |
| C100030 | Stutrings | Linda Martin | 2% | 11,413 | 17,870 | (36%) | 48,112 | 38,592 | 25% | 59,411 | 52,602 | 13% |
| C100053 | London Candoxy Storage Campus | Linda Martin | 2% | 11,321 | 14,711 | (23%) | 22,782 | 43,745 | (48%) | 59,117 | 46,688 | 27% |
| C100008 | Blanemark Hifi Shop | Peter Saddow | 2% | 21,327 | 2,763 | 672% | 54,077 | 18,351 | 195% | 56,998 | 21,012 | 171% |
| | Top 20 Total Sales: | | 53% | 368,694 | | | 1,134,962 | | | 1,984,142 | | |
| | All Other Customer Sales: | | 47% | 419,815 | | | 1,086,788 | | | 1,730,293 | | |
| | Total Sales: | | 100% | 788,509 | | | 2,221,750 | | | 3,714,434 | | |

## RECOMMENDATIONS

### Integration of BI and CRM Systems

CRM software is much focused on finding new Leads, Sales Pipelines and acquiring new customers.
To better understand and focus on your existing customers you need to know things like: what have they previously bought and when? What product groups are they not yet buying? When did they reduce volumes or stop buying? Such questions can be answered by BI system; therefore, complementary use of CRM systems and business intelligence will provide the path to customer loyalty. By possession of full Information about all transactions and customer's experience, companies can easily identify opportunities to improve satisfaction, retention, up sell, agent productivity and other key metrics. Therefore, in the modern business, CRM cannot be considered separately from Business Intelligence. They constitute a unique model that enables companies forecast customer behavior and make decisions based on these forecasts, and build long-term and profitable customer relationships (Habul & Pilav-Velic, 2010).

### Social Media and Business Intelligence Hand by Hand

Social media provides huge information that can help marketers to understand the behaviors and preferences of their customers, at the same time; it can include useless thoughts and opinions. Therefore, marketers need to deeply analyze the data in order to reach useful conclusions, and that arises the need of BI tools that can help marketing departments make the most of these important channels to market benefit in the way that allows an organization to test strategies. With social intelligence, businesses can compare the outcome of different approaches and identify the best strategy. Business intelligence (BI) solutions – which deliver API connectors for third-party Web applications – offer marketers the capability to analyze data captured and generated by popular social media platforms, such as Twitter, LinkedIn or YouTube. This analysis provides a quick and cost-effective way of understanding the impact of social media marketing activities (James, n.d.).

## THE NEXT LEVEL OF BI

Self-service business intelligence (SSBI) is a new trend in BI where softwares and tools are made comprehensive and simpler than before. The aim is the make business intelligence accessible to everyone including people with limited to no technical or statistical knowledge. It involves simplification of current systems and process to deliver more direct and actionable insights. With advancements in machine learning and data analysis, this dream will become more realistic and achievable (Newgenapps, 2017).

## CONCLUSION

Today, customers are more and more demanding, Companies can incur heavy losses when customers are not satisfied and do not return, therefore they need to have a better understanding of their customers' behaviors in order to improve service and products. and nowadays, there are multiple resources of customers' data especially with web services, such as websites, chatbots, emails, social media, PoS, ERP, CRM, SCM, therefore, it becomes difficult to collect all this huge data altogether and analyze it manually, from here, the necessity of business intelligence arises to help enterprises interact efficiently with data regardless of business size or scope. Business intelligence can help companies not only to better understand their customers, but also to foresee and impact their preferences and behaviors. It uses that collection of Big Data to provide clear vision of customers' actions and spending habits. This should help the organizations to better serve the customers, keep their existing customers and attract more targeted new customers, which in its turn will increase the profit (Hennel, n.d.).

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