

## **Building a Trading System**

Whenever I build a system there are many different facets and considerations to the systems development. I will attempt to break it down into a list of criteria that is imperative to determine whether or not it is a valid system or not, and for the decision to implementing a system.

Many Traders believe that if they have a good signal system to buy and sell, play a little of their capital, never more than 2%-3% of capital, then that's all they need. They back test for a couple months and if everything looks ok, they set off for the races and generally blow their accounts up within weeks or months. Why? There is so much more to consider than just basic entry and exit and basic money management.

- 1) Personal dedication required to monitoring a system in action.
- 2) What type of system is it, range bound or trend following? What pairs?
- 3) How long was the system back tested for? Are your system signals consistent enough to generate steady increases?
- 4) What is the system Potential Reliability, Win/Loss Ratio, and Relative Expectancy?
- 5) Is there a factor included into the data to compensate for uncertainties?
- 6) What Money Management criteria are you using and why?
- 7) Is there a set script of system rules to follow?
- 8) Trading psychology. Can you trade by the rules of the system without faltering?
- 9) Going forward and recording.

These are just a few points to consider when developing a system and the lack of consideration in any one of these will eventually cause havoc within your trading. I look at a system like baking a cake. You need more than just the basic flour and water. You need ingredients, such as eggs, sugar, starch, flavoring, sugar, filler, flour, milk, an oven, a cake pan, and a timer. I am no cook so maybe it's not the best analogy but I know without these basics, that cake will not taste very good. The same goes with a trading system. The system itself is the cake and all the requirements listed above are the ingredients to make it work consistently. Leave anything out and it will not be good. Now there are many different ways to make a cake and like a system, there are many different methods and "ingredients" that some think are better than others. I am just explaining what I consider within my system ingredients. So let's delve into the points a little more.

### **1). Personal Dedication.**

Whenever I think about a system, the first thing I think about is time! How much do I have to monitor charts? What time of day do I have to monitor charts? So if I am into only looking at charts a couple of times a day, then maybe the lowest timeframe to consider is a daily system where you would build something off of daily charts and weekly charts. If you don't mind looking at the charts every 4hrs or more than build a system based on the minimum time you could allocate to being at the charts beck and call. I live on the west coast of North America, so if I am using one of my 4hr systems, than I have to be prepared to look at the charts every 4hrs, including when new candles

appear at 2am and 6am, Monday thru Friday. No big deal for a week or two, but make sure you can sustain it for months and years, especially if it's a good system! Maybe you want to scalp for just a few pips a day, well the best time of that is between 3am Est. (London Session) and 12pm Est. (NY morning session). I have tried this and still scalp occasionally on the NY open but the London session for a North American based Trader is brutal in the long run, unless you are a night owl and sleep in the day. So carefully pick and choose your time allotment. This is a very important first step that should not be taken lightly or feathered upon half heartedly, without YOU the system will not be managed. This is your business and requires the needed dedication.

## 2). Type of System.

Now that you have your life sorted out for how much you can dedicate to it, start looking at the charts. Pick a currency pair; I suggest the most common like EUR/USD or GBP/USD to start with. Learn candles and how to interpret them. Play with indicators such as moving averages, stochastic, MACD, RSI, Fibonacci ratios, Elliot Wave theory basics, and other conventional and unconventional indicators. You may want to use a combination of these or just one, you decide. I believe in simplicity but also having the required information so I traditionally use a combinations of 3-5 indicators that are weighted in priority. For a description of different indicators and how to interpret them, get a good TA book or just do a search on the web for information on technical analysis, specifying the indicator. Once you have played around with a few and get familiar with patterns and how these chosen indicators work with the currency pair you have chosen. Run a little back test to determine roughly how successful these indicators are working within the characteristics of that currency pair and on that time frame setting. Is it worth continuing or does something need to be adjusted before further consideration? Keep plotting along with these indicators until you get a decent success factor of win vs. losses and or large wins in pips to low losses in pips. Ideally a system is good if you have the obvious high win rate with low losses when they occur, sounds easy doesn't it. Let me know when you get it. At this point if you want some versatility within your system, apply this basic indicator signal you discovered and try it on other pairs to see if the results are as consistent. At this point as well there is a need to consider applying a stop loss to your fictitious system. Some traders do not use them and some say they are imperative. I use them with some systems and not with others. Again it's a lot to do with how often you can manage the trades. I look at stop losses as a safety net. Never will I use a stop that will be too tight. I use these as a last resort, such as if I will be away for the day and in the event something catastrophic happens I want to be insured, so I will put a large stop loss in the event something goes terribly wrong somewhere in the world. In other words, I never want to be stopped out but will use them as an insurance policy. If my testing is complete and unbiased enough, I should have a pretty good idea what my worst case loss would be with all things being equal. Now I will use stop losses once in a trade that has gone my way to secure profit. This can be a trailing method or manually adjusted, but often these are very far away as well, these can be experimented with as you see fit, but be careful of getting stopped out of a trade prematurely just to see the pair reverse in your favor after the fact. The market has noise and must breathe, let it be so.

### 3) Run a Back Test.

OK, after we have what we think is something that looks promising we can do a further back test to at least 200 trades at this point (more to come). This magic number is nothing but a number, there is no magic but the more it is tested the more accurate it will become. Many believe that back testing is useless and biased. They are correct to a point. Without a back test there is no way to know if your system will work at all or even have the remote possibility of working, therefore I think back testing is very important, but more important is how it is back tested. To get an accurate result of the test, you must be consistent and completely unbiased. Enter and exit trades exactly as you have predetermined within the initial guidelines. Be conservative with your entry and exits, never say to yourself "Well if I was looking at this 6 months ago, I would exit here because I can feel the market turning". You have no idea what you would have felt like six months ago or six months from now, so leave all emotion out of the back test and enter and exit by your rules. The idea at this point is to find the failure within the system technical analysis. Do not bias it with emotion, because without a doubt, the weakest link in any system is the person managing it. More on the psychology later. I suggest when back testing, that you record all the data such as dates, direction, long or short, entry price, exit price, spread, win/loss into a spreadsheet using excel or something similar. If things still look good, such as an ok win ratio and a good win amount versus loss amount, then let's get deeper and find out just how promising this could be.

### 4). Potential Reliability, Win/Loss Ratio, and Relative Expectancy.

Now that you have run your entire unbiased back test, you can now do something with all that data. First, you should organize it. Make separate columns for wins and losses; include the broker spread, subtracting spread pips from winning trades and adding spread pips to losing trades. Only include the basic pip gain, not the multiplied by Lot pips gain, that will come later. So for example, if you are using a system on GBP/USD and the spread was 4 you can set up your spreadsheet as follows:

Trade	Date	Long/Short	Entry	Exit	Total	Pip Spread	Pip Gain	Trade Loss	Trade Win	Trade Loss..
1	1/18/07	Long	1.7615	1.7725	110	-4	106		1	0

Once you have all your trade data setup as such, run a total of all Pip Gains and Losses, and Trade Wins and Losses. So say you had 200 trades overall and there were 110 winners and 90 losers in your back test. There was a total pip gain of 5154 pips and a total loss of -2124 pips both including spreads. Your Net Pip Total is +3030 pips. Determine what the Reliability of winners versus losers was by dividing the wins by the total trades;  $110/200=0.55$  or 55% win rate. Next we determine the Win/Loss Ratio, by dividing the winning pip by losing pip totals; in this case it is  $5154/2124= 2.427$ , so this tell you that you would get 2.427 pips for every 1.0 pips lost, so W/L is 2.427. Also determine what your average wins and losses are in pips. Well I like to know that even though I have what appears to be a potentially good system for better gains than losses both in pips and win rate, I want to know what my Potential Estimated Relative Expectancy will be. This means for every dollar invested, what my gain is over and above that dollar. To get an estimated expectancy I will use the average loss as a baseline. This next step requires you to setup another spreadsheet or get a calculator and a pad of

paper. For this we will use 33 pips as an average loss (even if your loss was say 23.6 like it is here) and apply a 1 to 1 up to 99 pips for gains, a 3 to 1 for gains 100-199, 6 to 1 for gains 200-299, etc. We will do the same for the losses. Here is how the spreadsheet should look like:

Example.

Trades		200		
Gains Probability and Expectancy				
<u>Range</u>	<u>Number</u>	<u>Payoff # to</u>	<u>Probability</u>	<u>Expectancy</u>
1-100	57	1	0.285	0.285
101-200	39	3	0.195	0.585
201-300	9	6	0.045	0.270
301-400	3	9	0.015	0.135
401-500	2	12	0.010	0.120
600	0	15	0.000	0.000
Total	110			1.395
Loss' Probability and Expectancy				
<u>Range</u>	<u>Number</u>	<u>Payoff</u>	<u>Probability</u>	<u>Expectancy</u>
1-100	88	1	0.440	0.440
101-199	2	3	0.010	0.030
Total	90			0.470
		Relative Expectancy		0.925

The Probability column the number of trades within the specified range divided by 200 (total trades);  $57/200 = .285$ .

The Expectancy column is the Payoff # x the Probability. So for the second range the payoff is  $3 \times .195 = .585$ .

Once all the ranges are input for the gains and the losses and the Expectancy columns are summed, we subtract the Loss Expectancy from the Gain Expectancy and our Estimated Relative Expectancy is \$0.925 over and above every dollar invested. Anything over 0.50 is worth exploring. This is based on 1pip = \$1.00.

So now you have some estimated numbers to determine what you can expect from a system on a trade by trade basis. To recap;

Reliability	:	55%	The number of wins/losses
W/L Ratio:		2.427	Pips won/pips lost
Relative Expectancy:		0.925	Expected gain over every dollar invested.

This gives you an idea of what to expect as performance of a system if the system is followed exactly as it was built, and we all know that can be a challenge do to the simple fact that we as humans have emotions and schedules. There will be missed trades and fumbled exits and entries, this data is just an idea of what you could expect when moving ahead into real life trading. It is not exact, but a close estimate, remember the future doesn't always repeat the past, but if history does represent anything remotely close to future trades and they are executed properly, these estimates are a good gauge.

5). Include a Factor into the data to compensate for uncertainties.

What do I mean by this, well this could also be a psychological section as much as anything, but besides psychological there are other influences and uncertainties that can creep up into trading that cannot be accounted for when doing a system back test. Some of these things are the following; absence, lost internet connection during critical times, computer failures, major world events, slippage, and broker issues, etc. On the psychological side, well where do I begin...hmm. Ok, there's the hesitation after losing 6 in a row, the "I don't like the way the candle looks like even though my system says buy", the greed, over confidence, lack of confidence, chasing a trade even though your exit at a loss was triggered, and on and on...The point is there are many factors as to why going forward and trading a new system why it won't add up to the performance determined in a back test. This is why many feel back testing is false and biased, because it is. It's no problems and no emotion, everything trading has in real life. So how do we factor this in, well every individual is different when the psyche is involved and in my location, my internet may be less reliable than yours. The best thing to do is over time try and determine what the best factor applies to you. Personally I use a factor of 25%, meaning from all my data I apply 25% to my W/L Ratio (Gains/Losses) and my Reliability. I have discovered over time that I usually would trade a system less approximately 17%, so if I put in 25% I know I should be ok.

In this case we had Reliability of 55% - 25% = 41.5%

We had an W/L of 2.427 - 25% = 1.82

Now with this uncertainty factor included, we can move on to determine what are Money Management will be.

6). Money Management Criteria.

We often read and hear traders and "Guru's" say that good money management requires you to never expose more than 1%-3% of your trading capital on any given trade. Ok, but why? Where do they come up with that number? How do they come up with 2% vs. 3%? How many sustained losses can one expect and still be ok? What is the max loss in \$ can one expect with 1%-3% exposed? There are valid points to this 1%-3% rule, but I have never read or heard any detailed reason other than the lack of data and uncertainty in any given market should leave one never exposing too much, so if they get burned one day, they can live to play another day. Well, fair enough. If you have limited data to base any higher exposure than by all means, limit your exposure to the 1%-3% rule. In this case we have historical data that is a minimum of 200 trades, giving a Reliability factor and a win loss ratio, that have also been factored by 25% for market and individual uncertainties. We also have determined within those 200 trades what our worst loss was on a trade, and what our average loss was on a trade. From here, I use a version of what is called "The Kelly Formula" to determine optimum risk exposure based on win/loss ratio and reliability.

Kelly:  $OE = R - (1 - R) / (WL)$

OE = Optimum Exposure

R = Corrected Reliability = 41.5%

WL = Corrected WL = 1.82

$$OE = 41.5\% - (1-41.5\%)/(1.82)$$

$$OE = 9.5\%$$

In this particular system, based on the historical data, when applied our worst case trade if experienced again would have a maximum drawdown of 9.5% of capital. In addition to this as our capital increases so does our lot size, but never more than 9.5% and the reverse is true for a declining account. What we want to avoid is to martingale. When we lose trades and account capital is reduced so is our lot position size. So how do we apply this to our trading to determine how much in lot size should be exposed, based on 9.5% of capital. From the above data we had determined that our average loss on 90 losing trades was 23.6 pips, however a couple of them really got away and the worst was 112 pips. So 2 out of 200 trades were out of the norm, however, we always want to plan for the worst as we know the worst can and will happen. This is in addition to the 25% uncertainty factor already applied. Here is how we apply the Kelly for lot size positioning, assuming we are starting out and have a \$2500 trading capital balance:  
\$2500 Balance on a mini account.

$$2500 \times 9.5\% = 237 \text{ (This is our worst case loss)}$$

$$237 \div 112 \text{ (our worst historical loss)} = 2.12.$$

We round down and enter 2 lots for our trade based on Optimum capital. Now based on our averages of 23.6 pips per loss x 2 lots we would average 1.9% of capital on an average loss. Our average gain of 46.9 pips would result in 3.7% of gain on capital.

Result:           Maximum estimated drawdown is 9.5% of capital.  
                      Average estimated drawdown is 1.9% of capital.

With this in place it is imperative that you follow it and never over expose yourself. When a trader gets a string of winners, they tend to get over confident and start counting the cash before it has arrived Conversely, when a string of losses occur, there is a tendency to over expose to regain the losses as quickly as possible. Invariably, when one deviates from a proven method, things have a tendency to spiral out of control and a good situation is now bad or a bad situation is now even worse. Losses will occur just as they did in the back test, remember that the system has accounted for them so accept them. This isn't a sprint but a marathon, pace yourself and let the system work for you.

#### 7). Write out a script of System Rules to follow.

Now that you have come up with a winning method and have applied all the ingredients required, write down a detailed script of rules to follow when setting up charts, detailed indicator settings, entry and exit criteria, stop losses criteria and when to apply. Detail the purpose of your backup indicators, listing their system priority. List all of these rules in chronological order and apply them every time a trade is executed. Think of these like a checklist that a pilot would follow before preparing for a flight. You now have a flight plan in order with all your testing and system lot criteria. As you see an opportunity for a trade go thru the checklist like a pre takeoff checklist so you cover all required items. This will hopefully prevent you from crashing and burning.

#### 8). Trading Psychology.

This is a topic that would require a book dedicated unto itself. The best we can do is apply what we think is enough of a factor to a system that would compensate for our mental weakness with regards to money and trading. Some are inherently better than others. Over time, one can and should improve on their trader psyche. As you take loss after loss, initially this is extremely uncomfortable, but over time a string of losses becomes just part of the business and you learn to accept them as such without too much worry or panic. The best piece of advice I can give someone is knowledge is power. Learn as much as you can, for when things fall of the rails, you can reflect back on your understanding and knowledge of trading that will comfort you in uneasy time. So read, read, and read. Furthermore, trust your system. If you carefully prepared the data from historical data and executed a solid base for the test, further factoring a % for uncertainties, executed sound Money Management, and followed your rules, you should have a degree of confidence that from one trade to another, anything could happen, but in the end, things will prevail in your favor as long as you keep a cool head. Finally, we here people talk about their balanced life outside of the trading ring. This is also a very important factor that must not be taken for granted. Any stress or uneasiness we feel inside, no matter what the cause will put stress on our decision making process while trading. An example would be; a trader just found out that his wife is unhappy within the marriage and wants a divorce. Now obviously this person should be terribly worried and concerned, his mind is not on trading. Can you imagine how easy it would be to make a mistake when all this trader can think about is his screwed up marriage? Obviously it's time to work on other things, then when all is good and worked out on the personal side, then he can come back to the trading table. Remember, they aren't going to run out of pips. Now maybe this is an extreme example, but the message is still the same; a happy and well balanced trader, is a good trader.

#### 9). Going Forward and Recording.

Time to start trading. Now is the time to not only record your trades for the taxman, but for you primarily. Keep a detailed log of all your trades in the same format as how you conducted your back test. This overtime is now the data generated for the forward test. As time goes on you can rerun the numbers and see where you are relative to the original back test. It should easily reveal whether the data was as accurate as you thought. Whether the uncertainty factor is enough or too much. Adjust the money management accordingly with the new data, considering the new reliability factor and new win/loss ratio. In addition to the standard entry/exit log, write out a description log in word form, noting why you took the trade, why you put the stop loss in and where, how you feel about the trade. This is a useful tool to have to reflect back on when and if improvements are needed. Over time, you will always want to improve or develop a better system, and this is a good starting point. Without a good log of your trades, you will never know how well your system is performing.

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I do not claim to be an expert in system development. These are just some of the basic things I have picked up along the way in my trading and have applied all of these

ingredients into my systems development. They have worked for me and are in use today as I develop new systems and adjust and improve old ones. This is just a guideline and many traders will have critic for the certain items mentioned. That is fine, I am always a student and welcome critic as well as new and innovative ideas, so improvement and positive criticism is welcome.

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